

HS-801 001; 003-007; 016;  
HS-800 838-839; 843; 852; 862;  
880; 925; 995-999

HS-820 287-289; 307  
051; 054-057; 063-066;  
068-079; 090-091; 107; 113-120

Administration

UNITED STATES OF AMERICA

*Shelve in stacks  
S.B.T.*

# Highway Safety Literature

...A MONTHLY ABSTRACT JOURNAL

## AVAILABILITY OF DOCUMENTS

Documents listed in **Highway Safety Literature** are not available from the National Highway Traffic Safety Administration unless so specified. They must be ordered from the sources indicated on the citations, usually at cost. Ordering information for the most common sources is given below.

**NTIS:** National Technical Information Service, Springfield, Va. 22151.  
**Order by title and accession number: PB, AD, or HS:**

**GPO:** Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. **Give corporate author, title, personal author, and report number.**

**Corporate author:** Inquiries should be addressed to the organization listed in the individual citation.

**Reference copy only:** Documents may be examined at the NHTSA Technical Reference Division or borrowed on inter-library loan through your local library.

**See serial citation:** Obtain through normal loan or purchase of the given serial.

**SAE:** Society of Automotive Engineers, Dept. HSL, 2 Pennsylvania Plaza, New York, N.Y. 10001.  
**Order by title and SAE report number.**

**TRB:** Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

Material directly related to Highway and/or Motor Vehicle Safety is solicited for inclusion in Highway Safety Literature. Topics must fall within the scope of the mission of the National Highway Traffic Safety Administration. Submit material, together with a written statement of approval for publication to:

Technical Services Division (N48-41)  
National Highway Traffic  
Safety Administration  
400 7th Street, S.W.  
Washington, D.C. 20590

Please indicate availability source and price for the material.

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June 27, 1974

Dear Reader:


The response to our recent questionnaire was enthusiastic, and though they are still being processed we plan to implement some of your suggestions in the near future. One of the most common requests has been for the improvement of availability information, and we hope the new format herein is a step in that direction. We regret that in the past some of the information was destroyed in the machine processing prior to printing; we believe that those errors have been corrected although we continue to have some keying errors. Prices will also be included in the availability when that information is readily available to us.

We feel that the questionnaires are a means of gradually improving HSL by your suggestions, and we plan to use another questionnaire next winter. In the meantime you are invited to send us any comments which you feel would enhance the usefulness of HSL to the highway safety community. Some suggestions will probably be beyond the capabilities of our budget, but all will be seriously reviewed and considered.

A very few of you returned the questionnaire without your name and address while indicating that you wished to continue to receive the publication. We hope we do not lose you as a subscriber when the new mailing list is set up. Publication of HSL is now on a monthly basis; if a copy does not reach you on schedule, please let us know.

Thank you for your interest.

Sincerely,

  
The HSL Production Staff

HS-014 016

### **AN ASSESSMENT OF DIESEL ENGINE POPPET VALVES**

Factors are reviewed regarding the reliability and durability of poppet valves of highly rated medium speed diesels burning standard or residual oils, with particular reference to the latter. From detailed analysis, the undercut or tuliped profile appears preferable. Valve behavior under operating conditions suggests a passive part in the phenomenon of valve sinkage. Adoption of differentially angled seats seems to have little meaning in practice. Cylinder head deflection was observed to be a governing feature in seat guttering. A review of material properties indicates inadequacy of the often quoted Eichelberg quality factor; an alternative parameter for assessing materials suitability is derived. Poor resistance to corrosion characterizes all present materials. A number of possible palliatives are examined.

by R. Bertodo; S. Sivakumaran  
Perkins Engines Ltd., Peterborough, Northamps. (England);  
Ruston Paxman Diesels Ltd., Newton-le-Willows, Lancs. (England)  
Institution of Mechanical Engineers Proceedings v187 n2 p31-41 (1973)  
1973 ; 21refs  
Prepared for presentation at an ordinary meeting of the Institution of Mechanical Engineers, London, 17 Jan 1973.  
Availability: See serial citation

HS-014 087

### **WE DRIVERS. REV. ED.**

Various aspects of driving and safety are reviewed in a series of brief discussions. Topics covered include: driver behavior and responsibilities; defensive driving; city driving; freeway driving; owner's manuals; brakes and braking; highway curves and passing; night and wet weather driving; fog, mist, and haze; winter driving; long-distance driving; hill and mountain driving; road signs; emergency situations; tires; trailer towing; anti-theft measures; seat belts; drinking drivers; built-in safety features.

General Motors Corp., Detroit, Mich. Public Relations Staff  
1972 ; 88p  
Availability: Corporate author

HS-014 088

### **MAN-MACHINE INTERFACE IN THE URBAN CLEAN AIR CAR DESIGN**

The design of an instrument panel for the steam powered, clean air, urban vehicle constructed at Rensselaer Polytechnic Institute for the 1973 Urban Clean Air Car Competition is described. Major human factors aspects of the man-vehicle interaction are emphasized. Empirically established principles involving display-control compatibility, population stereotypes, and spatial relationships were incorporated into the design, resulting in a viable and efficient configuration. Aspects of the design, including displays, labels, and switches, are adaptable to current passenger vehicles.

by F. Liuzzi; R. Riccio  
Rensselaer Polytechnic Inst., Troy, N. Y.  
Proceedings of the Seventeenth Annual Meeting of the Human Factors Society, Santa Monica, 1973 p136-40  
1973 ; 7refs  
Availability: See serial citation

HS-014 089

### **AN EXPLORATORY STUDY OF DRIVER MIRROR USAGE WITH PERISCOPIC AND CONVENTIONAL REAR VISION SYSTEMS**

The merits of a periscopic rear vision system are compared with a conventional system in passenger vehicles. The periscopic system consists of a conventional side view mirror and a roof mounted periscopic rear vision mirror. Test driver data were recorded by photographing the drivers' eyes while driving the experimental vehicle. Data collection was restricted to the freeway, involving specific tasks such as changing lanes, passing, entering, and exiting. Results show that driver time spent using the two rear vision systems was similar, but total time spent on the two mirror systems was significantly different for the different tasks; time-sharing with the side view mirror and rear view mirror was significantly different; mean glance durations on the rear view and periscopic mirrors were similar, but different on the side view mirrors as well as the different tasks.

by D. H. Hoffmeister  
Ohio State Univ., Columbus  
Proceedings of the Seventeenth Annual Meeting of the Human Factors Society, Santa Monica, 1973 p141-51  
1973 ; 2refs

HS-014 090

### **VISUAL SEARCH BY DRIVERS IN FREEWAY MERGING: IMPLICATIONS FOR VEHICLE DESIGN**

The visual field requirements of passenger vehicles in freeway merging situations are analyzed by studying the match between the visual search and scan behavior of drivers and the angular locations of other merging vehicles moving on side or near collision courses in the visual field of the vehicle. Three phases of research were conducted: recording visual search and scan patterns of test drivers with a television eye-marker system in an instrumented vehicle; determining the angular locations of target vehicles in the vicinity of the entrance ramp nose by computer simulation; analyzing the data to evaluate the criticality of the visual obstructions in the driver's visual field caused by the six roof pillars of the standard four-door sedans. Results generally indicate that the left rear roof pillar obstruction is the most critical, and that design improvements should include minimizing the size of obstructions and improving rear vision systems.

HS-014 092

by V. D. Bhise  
Ohio State Univ., Columbus  
Proceedings of the Seventeenth Annual Meeting of the Human Factors Society, Santa Monica, 1973 p152-61  
1973 ; 5refs  
Availability: See serial citation

HS-014 091

### **RISK TAKING BEHAVIOR AND INFORMATION SEEKING BEHAVIOR OF DRIVERS IN A DRIVE THROUGH GAP SITUATION**

The risk taking behavior and information seeking behavior of drivers when approaching and driving through a gap were studied in field experiments with an instrumented vehicle. Eye movements and temporal looking activities, as well as a secondary task were used to investigate the information seeking activities. The effects of gap size, vehicle speed, and reward conditions were examined, and results indicate that the number of looks made, the percentage of time looked at the gap, and the average duration of the looks made during an approach increase nearly linear with decreasing positive gap clearance. Psychometric risk acceptance functions were calculated along with the mean risk scores for each driver. Some drivers exhibited a considerably higher risk acceptance decision variability under the reward condition.

by H. T. Zwahlen  
Ohio Univ., Athens  
Proceedings of the Seventeenth Annual Meeting of the Human Factors Society, Santa Monica, 1973 p162-73  
1973 ; 10refs  
Availability: See serial citation

HS-014 092

### **THE EFFECT OF LOW VISIBILITY ON THE PERFORMANCE OF VEHICLE OPERATORS**

An experimental program to identify the relationship between visibility conditions and operator performance is discussed. Average speed in negotiating a controlled course is taken as the measure of operator performance. The method to measure visibility is discussed. It is shown that despite use of a contrived test course and artificially reduced visibility, the results appear valid. It is also shown that the relationship between visibility conditions and average speed can be represented with a simple, second order equation.

by R. Liston  
Cold Regions Res. and Engineering Lab., Hanover, N. H.  
Rept. No. AD-749 248; CRREL-TR-237 ; 1972 ; 16p  
Prepared for U. S. Army Materiel Command, Washington, D.C.  
Availability: NTIS

HS-014 093

### **SUBMERGING VEHICLES**

The behavior of cars in car-in-water accidents and the chances of escaping them are examined in order to make recommendations for vehicle structural requirements. Descriptive and experimental research was conducted. Recommendations are offered relating to the road situation, to the vehicle, and to the behavior of the occupants. An appendix gives a summary of the dynamic crash tests.

HSI 74-8

by A. A. Vis, comp.  
Stichting Wetenschappelijk Onderzoek Verkeersveiligheid, Voorburg (Netherlands)  
Rept. No. 1973-1E ; 1973 ; 71p 5refs  
Prepared for the Minister of Social Affairs and Public Health.  
Availability: Institute for Road Safety Research SWOV, Voorburg 2119, The Netherlands

HS-014 094

### **A SYNTHESIS ON STUDED TIRES**

Data and comments on studded tires as applicable to Utah highways are presented, pointing out their advantages along with the accruing safety hazards and excessive pavement wear due to the use of studs. Specific consideration is given to accident studies, negating psychological effects, performance tests (such as stopping distance, lane change breakout speed, and starting traction), roadway conditions, and adverse safety effects. Several studies on pavement wear are cited, and added costs for pavement maintenance are reviewed.

by D. E. Peterson; D. G. Blake  
Utah State Dept. of Highways, Salt Lake City  
1973 ; 112p 103refs  
Availability: Corporate author

HS-014 095

### **MOTORCYCLE FACTS**

Various aspects of motorcycle vehicles and operators are reviewed. Statistics are provided on types of vehicles involved in accidents, motorcycle fatalities, accident severity and types, and other factors such as directional analysis, time and day, and road and weather conditions. Human factors include age, sex, and residence of operator, passengers, and operator experience. Injuries are classified by part of body. The make and weight of motorcycles, and motor scooter accidents are also discussed. The status of motorcycle legislation is reviewed and safety recommendations are outlined, with protective apparel emphasized. The National Safety Council's Defensive Driving Course Motorcycle Supplement is noted.

National Safety Council, Chicago, Ill.  
1973 ; 7p 20refs  
Availability: Corporate author

HS-014 096

### **PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, SAN FRANCISCO, 1972**

Pedestrian and bicycle safety aspects are discussed in a planning and design seminar that focuses on seven major areas: planned pedestrian environments; pedestrian analysis and design; pedestrian and bicycle safety; pedestrian and bicycle planning; bicycle facilities (standards, design, and planning); bicycle equipment design; and the public view of bicycles and bikeways. Specific topics covered include city streets, spatial design, urban transportation systems, stairways, airports, highway research, accident countermeasures, bicycle control, bikeways, experiences in specific cities and states, bicycle commuting, and funding.

June 27, 1974

HS-014 101

California Univ. Inst. of Transp. And Traf. Engineering  
1972 ; 245p refs  
Presented by the Metropolitan Assoc. of Urban Designers and  
Environmental Planners, Inc., San Francisco, 13-15 Dec 1972.  
Includes HS-014 097--HS-014 104.  
Availability: Corporate author, \$6.50

by M. B. Snyder  
National Hwy. Traf. Safety Administration, Washington, D. C.  
HS-014 096, Proceedings of the Pedestrian/Bicycle Planning  
and Design Seminar, Berkeley, 1973 p152-8  
1973 ; 2refs  
Availability: In HS-014 096

HS-014 097

### **HIGHWAY RESEARCH PROGRAM TO ENHANCE PEDESTRIAN SAFETY**

The Pedestrian Safety Research Project of the Federal Highway Administration is discussed, with statistical emphasis on the scope of the problem. Pedestrian fatalities are compared with other classes of highway fatalities and are found to be exceeded only by fixed object collision fatalities; 64% occur in urban areas, 36% in rural areas. Project 1E, structured to improve the safety and accommodation of pedestrians, is described. Two tasks were developed, studying the feasibility and cost effectiveness of physical separation of pedestrians and vehicles, and studying solutions to the problem of pedestrian safety on the existing system. Major causal types of pedestrian deaths are reviewed, and areas of study are outlined, including behavior countermeasures, rural fatalities, pedestrian signalization, school children protection, and bicyclist safety.

by J. A. Fee  
Federal Hwy. Administration, Washington, D. C.  
HS-014 096, Proceedings of the Pedestrian/Bicycle Planning  
and Design Seminar, Berkeley, 1973 p148-51  
1973 ;  
Availability: In HS-014 096

HS-014 098

### **A PEDESTRIAN ACCIDENT COUNTERMEASURE PROGRAM**

Three aspects of pedestrian safety are considered: things known about the problem, potential solutions, and some of the programs designed to develop the solutions. Problem generalizations are discussed, including the primary occurrence of accidents in urban areas, the heavy involvement of younger pedestrians in rural accidents, and the role of alcohol. Emphasis is on pedestrian accident types, such as dart-out, vehicle turn, pedestrian waiting, and bus stop. Potential countermeasure activities are described which can be developed and applied with promise of significant reductions in pedestrian casualties. These include local regulations and operations; training, information, and education; vehicle modification; and pedestrian vehicle separation. A developmental program to implement these countermeasures is outlined.

HS-014 099

### **THE PEDESTRIAN AND BICYCLIST IN THE URBAN SETTING**

Problems of the pedestrian and bicyclist in the urban setting are discussed, with emphasis on two projects in New York City: a proposal for one or more safe bike lanes for commuting purposes, and a proposal for a series of pedestrian malls in midtown Manhattan. Driver and pedestrian attitudes in the city are described along with the general congestion and dangers. The revival of biking and subsequent biking groups and political action are reviewed. Pedestrian and bicyclist organization is recommended.

by C. Sidamon-Eristoff  
New York City Transp. Administration, N. Y.  
HS-014 096, Proceedings of the Pedestrian/Bicycle Planning  
and Design Seminar, Berkeley, 1973 p161-3  
1973 ;  
Availability: In HS-014 096

HS-014 100

### **PLANNING CRITERIA FOR BIKEWAYS**

Methods for providing safe, efficient, and enjoyable mobility for the cyclist and those with whom he interacts are discussed. The role of civil, and traffic and transportation engineers is cited in organizing bikeway planning. Travel characteristics are described: travel type and purpose, trip length and travel time, and time of trips. Other considerations discussed include joint use development, mixed mode bicycle travel, bicycle support systems, and terminal facilities. Bikeway types are defined as exclusive, restricted, or shared; and design criteria include outside lane dimension, parking, bikeway width, vehicle speed and volume, bikeway capacity, curvature and grade, surfacing, intersections and crossings, signing, costs, and financing.

by V. R. Desimone  
Automobile Club of Southern California, Los Angeles  
HS-014 096, Proceedings of the Pedestrian/Bicycle Planning  
and Design Seminar, Berkeley, 1973 p 166-75  
1972 ;  
Availability: In HS-014 096

HS-014 101

### **URBAN DESIGN TO ENCOURAGE BICYCLE USE**

Urban design is discussed as it relates to bikeway planning for utility oriented cyclists. System criteria are described with focus on the need for it to be area-wide and have continuity; German standards are reviewed. Guidelines for design selection criteria are offered, based upon the functional characteristics of the various bikeway design types and the relevant character and constraints of the individual corridor, such as mixed traffic, on-street lanes, protected lanes, and separate paths. Bike facility capacity and dimension requirements are detailed, and specifications are outlined for grade separations,

overpasses or underpasses, and grades. Hazards of two-way bike paths are cited.

by D. Smith, Jr.  
De Leuw, Cather and Co., Chicago, Ill.  
HS-014 096, Proceedings of the Pedestrian/Bicycle Planning and Design Seminar, Berkeley, 1973 p178-86  
1973 ; 8refs  
Availability: In HS-014 096

HS-014 102

### **TOWARD A DUAL-MODE BICYCLE TRANSPORTATION SYSTEM**

Trends toward a dual-mode bicycle transportation system are discussed, defined as situations in which a smaller, short-range vehicle is physically carried by a larger vehicle during long trips. The size of the bicycle enables it to be carried on almost all larger vehicles, including public transport vehicles. The possibilities for an extensive dual-mode system which would provide a viable alternative to the automobile are discussed. Consideration is given to the characteristics and benefits of the bicycle, bikeways, bicycle parking facilities and theft protection, bikes on public transportation, and storage. The bicycle-on-bus combination is emphasized, with details given on route planning and ridership, size restriction effects, bicycles carried inside the bus, and in a special trailer behind buses. Special vehicle design is also outlined.

by D. M. Eggleston  
California State Univ., San Diego  
HS-014 096, Proceedings of the Pedestrian/Bicycle Planning and Design Seminar, Berkeley, 1973 p187-97  
1973 ; 6refs  
Availability: In HS-014 096

HS-014 103

### **THE CHICAGO EXPERIENCE IN BICYCLE FACILITY PLANNING AND DESIGN**

A Comprehensive Bicycle Route System developed in Chicago in 1971 is described. Its major goals include creation of a continuous bikeway along the lakefront, development of a bikeway system to connect existing bicycle paths in city parks with each other and with existing and proposed bikeways in adjacent county and state recreation areas, development of a bikeway system to serve major generators and attractors of bicycle commuters, development of specialized bikeway systems in areas of architectural, historic, or similar interest, and development of supportive services such as secure parking facilities for users of the bikeway system. The program implementation is described and evaluated, and expanded 1972 guidelines are outlined such as a trial exclusive bicycle lane. Driver education, bike registration, federal funding, and weekend use of city streets are also discussed.

by M. A. Zimmerman  
Chicago Dept. of Devel. and Planning, Ill.  
HS-014 096, Proceedings of the Pedestrian/Bicycle Planning and Design Seminar, Berkeley, 1973 p202-7  
1973 ;  
Availability: In HS-014 096

HS-014 104

### **THE DENVER EXPERIENCE**

A pilot project in Denver pertaining to a bicycle way system in the city and county is described. Four surveys were conducted to gather data on present and potential commuter cyclists and recreational bicycle use. The proposed 164-mile Denver Bikeway System utilizes various on- and off-street bicycle route designs. Off-street designs include a parkway median bicycle path, sidewalk bicycle path, utility and abandoned railroad rights of way, and river banks, drainage gulches, and canals. Recommendations are offered on the pilot route network, the total bikeway system, bicycle-bus transfer system, pedal hopper, personal rapid transit concept, costs, parking facilities, and bicycle registration.

by F. L. Wolfe  
Denver Planning Office, Colo.  
HS-014 096, Proceedings of the Pedestrian/Bicycle Planning and Design Seminar, Berkeley, 1973 p218-26  
1973 ;  
Availability: In HS-014 096

HS-014 105

### **THE WHO AND WHEN OF ACCIDENT RISK: CAN DRIVER LICENSE PROGRAMS PROVIDE COUNTERMEASURES?**

A cross-section of exposure trips from a state-conducted origin and destination survey was compared with accidents occurring in the same geographical region and at the same season of the year. Exposure and accident trips included only passenger cars during week days. Age trends for accident risk were comparable by sex. Generally young drivers up to age 25 were overrepresented in accidents; males aged 25-54 and females aged 25-44 were underrepresented. After these ages risk increased, with a marked elevation in risk after age 65. The highest risk time of day is between midnight and 6 a.m., with female and elderly drivers showing the most marked elevations. The only other period showing a fairly consistent elevation in risk, though minor, was between 4 p.m. and 6 p.m. Possible ways are discussed in which driver license programs could monitor more closely the driving performance of those drivers belonging to high risk groups.

June 27, 1974-

HS-014 110

by P. F. Waller; D. W. Reinfurt  
North Carolina Univ., Chapel Hill. Hwy. Safety Res. Center  
1973 ; 75p 6refs  
Supported by the North Carolina Governor's Highway Safety  
Program.  
Availability: Corporate author

HS-014 106

### **AN INVESTIGATION OF THE RELATIONSHIPS BETWEEN INDUCED "FATIGUE" AND HEART RATE**

The relationship between heart rate and a subjective rating of fatigue during a tracking task was investigated with 9 male subjects operating the controls of an automobile mock-up. The task consisted of tracking a multiple sine wave which was presented on a moving oscillograph chart; the steering wheel controlled an oscillograph stylus. Heart rate was monitored through electrodes. Each subject also completed the Feeling Tone Checklist before the first half-hour tracking period, during a break, and immediately following the second half-hour tracking period. It was found that heart rate was not related to the subjective index of fatigue; heart rate changed between the tracking task and the break but not during the task itself; subjects were subjectively more fatigued at the end of the experimental period; the onset of subjective fatigue occurred within the first 30 mins. of the task and showed no further change after 30 more mins. of tracking.

by D. E. Neil; T. R. Johns  
North Carolina Univ., Chapel Hill. Highway Safety Research  
Center  
1973 ; 29p 21refs  
Sponsored by the North Carolina Governor's Highway Safety  
Program.  
Availability: Corporate author

HS-014 107

### **RELATIONSHIP BETWEEN DRIVER CRASH INJURY AND PASSENGER CAR WEIGHT**

Using data from North Carolina highway accidents, the relationship between driver injury and passenger car weight is investigated for a variety of known car makes and model years. Injuries sustained by unbelted drivers are compared across car weights for single vehicle ran-off-road crashes and for car-to-car crashes. In car-to-car crashes there is a definite negative relationship between car weight and a derived serious injury index which represents the ratio of the observed frequency of serious injuries in a given make and model year to the expected number of serious injuries based on the proportion of serious injuries sustained by the totality of drivers in the study. There is no association between car weight and injury in the single car ran-off-road crashes. In car-to-car crashes, serious injuries are considerably more prevalent in crashes involving cars in the lightest weight classes and generally decline with increasing car weight.

by B. J. Campbell; D. W. Reinfurt  
North Carolina Univ., Chapel Hill. Hwy. Safety Res. Center  
Grant 310-73-001-001  
1973 ; 59p

Sponsored by the Insurance Institute for Highway Safety and  
the North Carolina Governor's Highway Safety Program.  
Availability: Corporate author

HS-014 108

### **ANALYSIS OF THE BENEFITS DERIVED FROM CERTAIN PRESENTLY EXISTING MOTOR VEHICLE SAFETY DEVICES: A REVIEW OF THE LITERATURE**

A review of the literature on the effectiveness of certain crash protection devices introduced into automobiles in the 1960's is presented. Reviews on lap belts are included, along with shoulder belts, energy absorbing steering columns, high penetration resistant windshields, head restraints, and side door beams. Only those articles which evaluated safety devices by sampling real-world accidents were reviewed. Articles which evaluated the devices in controlled crash situations, and articles based on clinical evaluations of unique accidents were not considered.

by L. I. Griffin, 3rd  
North Carolina Univ., Chapel Hill. Hwy. Safety Res. Center  
Grant MVMA-ECON-3-HSRC  
1973 ; 50p 39refs  
Prepared for the Motor Vehicle Manufacturers Association of  
the United States, Inc.  
Availability: Corporate author

HS-014 109

### **A BIBLIOGRAPHY OF WHIPLASH AND CERVICAL KINEMATIC MEASUREMENT**

A bibliography of whiplash and cervical kinematic measurement is presented which focuses on four major areas: motion and mobility, biomechanical and experimental data, anatomy and radiology, and injuries. The literature search was undertaken to provide a base of information for use of diverse disciplines, bringing together a compilation of 2326 references. Prefacing each of the four major sections is an introduction which defines in detail the nature of the subject matter. Foreign references in over 23 languages are included.

by P. J. Van Eck; D. B. Chaffin; D. R. Foust; J. K. Baum; R. G. Snyder  
Michigan Univ., Ann Arbor  
1973 ; 164p refs  
Prepared for The Insurance Institute for Highway Safety,  
Washington, D. C.  
Availability: Corporate authors

HS-014 110

### **AUTOMOTIVE SPARK IGNITION ENGINE EMISSION CONTROL SYSTEMS TO MEET THE REQUIREMENTS OF THE 1970 CLEAN AIR AMENDMENTS**

Data are summarized on the performance of emission control systems for spark-ignition engines that approach the degree of control required to meet the 1975 and 1976 automobile emis-

HS-014 111

sion standards as required by the 1970 Clean Air Amendments. Emission control for conventional engines and also unconventional approaches for spark-ignition engines are discussed. The lead time necessary for production is also considered.

National Academy of Sciences--National Res. Council,  
Washington, D. C.  
Contract EPA-68-01-0402  
Rept. No. PB-224 862 ; 1973 ; 115p  
Prepared for the Environmental Protection Agency,  
Washington, D. C.  
Availability: NTIS

HS-014 111

### **CALIFORNIA DRIVER TRAINING EVALUATION STUDY. SUMMARY OF FINAL REPORT TO THE CALIFORNIA LEGISLATURE**

Major findings resulting from the California Driver Training Evaluation Study are summarized. The study compared benefits and costs of driver training as given in state high schools by certificated high school teachers with that given by commercial driving school instructors. On training variables it was found that commercially trained students were somewhat superior, students trained in long programs were superior, students trained in short simulator programs were inferior to all other groups, and males were superior in most variables except those measuring attitudes. Commercially trained and long-program-trained students scored higher on road tests. Students trained in public programs have somewhat fewer traffic citations, but there is no difference in accident rate with commercially trained students. Males have worse records. Commercial training and 6-hour programs are most cost beneficial.

by M. H. Jones  
California Univ., Los Angeles  
1973 ; 31p  
Prepared in cooperation with the Dept. of Motor Vehicles,  
Calif.  
Availability: Corporate author

HS-014 112

### **COMPULSORY WEARING OF SEAT BELTS IN NEW SOUTH WALES, AUSTRALIA. AN EVALUATION OF ITS EFFECT ON VEHICLE OCCUPANT DEATHS IN THE FIRST YEAR**

The effect of compulsory seat-belt wearing on occupant fatalities in Australia is examined. A simple regression model was used as a predictor for the expected number of motor-vehicle occupant deaths in 1972, the year following enactment of the law. The actual number of vehicle-occupant deaths that year was 25% below the predicted figure, and this drop is shown to be statistically significant. There was no accompanying drop in the total population, the number of licensed drivers, the number of vehicles on the register, the annual number of registrations of new vehicles, or the annual consumption of gasoline. It is suggested that the legislation requiring seat belt usage was responsible for the fatality decrease.

by M. Henderson; R. Wood  
New South Wales. Dept. of Motor Transport, Sidney  
(Australia)  
Rept. No. TARU-4/73 ; 1973 ; 15p 13refs  
Published in the Medical Journal of Australia, 28 Oct 1973.  
Availability: Corporate author

HS-014 113

### **COMPULSORY SEAT BELT WEARING IN AUSTRALIA**

Compulsory seat belt usage in Australia is discussed. Consideration is given to the 1970 legislation enactment, enforcement, public attitude, and effects of the law on belt usage and on the total number of injuries and fatalities. Statistics are presented indicating the effectiveness of the legislation. It is shown that the law has substantially increased belt usage rates and has significantly decreased driver and passenger fatalities and injuries. It is suggested that there is room for more enforcement, education, and improved seat belt design to maximize the effectiveness of the legislation.

by A. P. Vulcan  
New South Wales. Dept. of Motor Transport, Sidney  
(Australia)  
1973 ; 15p 9refs  
This paper is an updated version of the paper presented at the 16th Stapp Car Crash Conference, November 1972.  
Availability: Corporate author

HS-014 114

### **WHAT PRICE DEATH?**

Truck accident fatalities and driver errors are discussed in relation to industry costs and public attitudes toward the industry. Driver carelessness and excessive speed are cited and several multiple vehicle crashes are described. Industry growth is seen as the cause of decreased safety measures and dilution of management control over drivers and vehicles. Legislative reactions to the increased accident rates are noted, including Congressional proposals for higher fines for truckers.

by C. Glines  
Commercial Car Journal v126 n5 p75-83 (Jan 1974)  
1974 ; 9p  
Availability: See serial citation

HS-014 115

### **CHLORIDE AND WATER PERMEABILITY OF AUTOMOTIVE BRAKE HOSE. FINAL REPORT**

The chloride and water permeability of hydraulic brake hoses was studied. Permeability parameters measured were time interval, temperature, type of exposure, type of brake hose composition, type of brake fluid, and the cation linked with the chloride ion. It was found that sufficient chloride and water will permeate brake hoses to initiate corrosion of metal parts in the conventional brake system. The extent of permeability is greatly reduced in systems containing silicone fluids.



by J. B. Counts; R. G. Jamison  
Army Coating and Chemical Lab., Aberdeen Proving Ground,  
Md.  
Rept. No. CCL-R-306; AD-748 083 ; 1972 ; 28p 11refs  
Sponsored by the U. S. Army Materiel Command,  
Washington, D. C.  
Availability: NTIS

HS-014 116

# **DEMONSTRATION OF A TEST-DRIVER TECHNIQUE TO ASSESS THE EFFECTS OF ROADWAY GEOMETRICS AND DEVELOPMENT ON SPEED SELECTION**

It is shown that the test-driver methodology is an efficient, reliable, and valid technique for assessing factors on rural highways related to speed selection. The validity of this technique is shown in its verification of horizontal curvature-speed relations, developed in 1957, in predicting user speeds within plus or minus 5 mph, and in the resolution of past conflicting results concerning the relation of speed and lateral acceleration on horizontal curves. The reliability is demonstrated by the consistency of the results of two experiments each with different test drivers on different routes. The efficiency is indicated in the development of a wide spectrum of estimates of major contributors to speed variation with the use of 30 test drivers.

by J. B. Neuhardt; G. D. Herrin; T. H. Rockwell  
Ohio State Univ., Columbus. Dept. of Industrial Engineering  
Rept. No. EES-326-B ; 1971 ; 209p 36refs  
Availability: Corporate author

HS-014 117

# **THE ROAD ACCIDENT SITUATION IN AUSTRALIA. A NATIONAL REVIEW**

Various aspects of road accidents, injuries and fatalities in Australia are reviewed. It is found that accidents are rarely caused by a single factor, but represent failures in the operation of the interacting components of a large and complicated transport system involving the vehicle, the road environment, the road user, and his social environment. Specific chapters are included on the road user, the vehicle, town planning and road design, traffic management, the postcrash phase, the institutional framework, a summary of recommendations, and a statistical appendix.

by C. L. D. Meares; J. A. Brabham; E. F. Campbell; P. J. Kenny; P. G. Pak-Poy; J. S. Robertson; S. E. Solomon; M. F. Sweeny  
Australia Dept. of Shipping and Transport, Canberra, A.C.T.  
1972 ; 176p 330refs  
Includes HS-014 118--HS-014 125.  
Availability: Corporate author

HS-014 118

# **THE ROAD USER**

The human factors involved in road accidents in Australia are presented. The use of alcohol is examined generally, with specific consideration given to assessment of blood alcohol concentration and measures to reduce drinking and driving. The use of other drugs is also described. Driver education and

training are discussed in terms of school programs, and initial and advanced training. General road safety publicity methods are studied along with criticism of publicity, types of publicity, and safety campaign planning. The effectiveness and testing practices for driver/rider licensing are described, with age factors noted. Traffic legislation standards are reviewed, as well as enforcement and punishment effectiveness. Recommendations for action to be taken as well as further studies to be made are given for each topic.

by J. A. Brabham; E. F. Campbell; P. J. Kenny; P. G. Pak-Poy; J. S. Robertson; S. E. Solomon; M. F. Sweeny; C. L. D. Meares  
Australia Dept. of Shipping and Transport, Canberra, A.C.T.  
HS-014 117, The Road Accident Situation in Australia,  
Canberra, 1972 p15-35  
1972 ;  
Availability: In HS-014 117

HS-014 119

# **THE VEHICLE**

Vehicle design to reduce Australian accidents and injuries, vehicle inspection, and cycles and motorcycles are discussed. Design standards and their effectiveness in accident prevention are evaluated, including weight, steering and handling, lighting, and glass. Factors affecting commercial and towed vehicles are noted. Safety standards for occupant restraint, interior design, compartment integrity, post-accident phase, exterior design for pedestrian safety, trucks and buses, and future research needs are detailed. Vehicle inspection is described in terms of the relationship between vehicle defects and accidents, and of the effect of inspection plans on vehicle condition and on accidents. Cycles and motorcycles are discussed in general, followed by standards and safety measure effectiveness. Recommendations are offered.

by C. L. D. Meares; J. A. Brabham; E. F. Campbell; P. J. Kenny; P. G. Pak-Poy; J. W. Robertson; S. E. Solomon; M. F. Sweeny  
Australia Dept. of Shipping and Transport, Canberra, A.C.T.  
HS-014 117, The Road Accident Situation in Australia,  
Canberra, 1972 p36-55  
1972 ;  
Availability: In HS-014 117

HS-014 120

# **TOWN PLANNING AND ROAD DESIGN**

Town planning and road design are examined as they relate to Australian highway safety. The hierarchy of urban development is discussed, along with layout of both the road and pedestrian network and public transportation. Roadway standards and responsibility are described, and factors such as geometric properties, roadway surface, and control of vehicular conflict (medians and access) are included. General roadside design, involving common hazards (poles, supports, trees, etc.), guardrails, and spot improvements is considered. Standards, effectiveness, and financing of streetlighting are outlined, along with aspects of railway crossings, such as accident frequency, effectiveness of countermeasures, and identification of deficient crossings. Recommendations are offered.

by C. L. D. Meares; J. A. Brabham; E. F. Campbell; P. J. Kenny; P. G. Pak-Poy; J. S. Robertson; S. E. Solomon; M. F. Sweeny  
Australia Dept. of Shipping and Transport, Canberra, A.C.T.  
HS-014 117, The Road Accident Situation in Australia,  
Canberra, 1972 p56-81  
1972 ;  
Availability: In HS-014 117

HS-014 121

## TRAFFIC MANAGEMENT

Traffic management in Australia is discussed in terms of intersection rules, traffic and speed control, and pedestrian protection. General rules of precedence are cited along with intersection priority by other means. Regulatory traffic control devices and non-regulatory devices are detailed. Speed control is discussed with regard to standards, and urban and rural speed limits. Pedestrian protection is considered from the viewpoints of standards, measures to promote pedestrian safety (such as crossings, visibility, separation, etc.), and legal aspects. Specific recommendations are offered for each category.

by C. L. D. Meares; J. A. Brabham; E. F. Campbell; P. J. Kenny; P. G. Pak-Poy; J. S. Robertson; S. E. Solomon; M. F. Sweeny  
Australia Dept. of Shipping and Transport, Canberra, A.C.T.  
HS-014 117, The Road Accident Situation in Australia,  
Canberra, 1972 p82-101  
1972 ;  
Availability: In HS-014 117

HS-014 122

## THE POST-CRASH PHASE

Australian emergency services, insurance, and accident information are discussed as part of the postcrash phase of accidents. Road and air ambulance services, the crash scene, and the hospital casualty department are described. Insurance is considered in terms of objectives, effectiveness in reducing accidents (compensation without fault and property damage). Accident information acquired from reports and investigation is examined with focus on the mass data system (data processing, records integration, collection), the in-depth approach, exposure and trip data, and other statistical information. Recommendations are offered for each category.

by C. L. D. Meares; J. A. Brabham; E. F. Campbell; P. J. Kenny; P. G. Pak-Poy; J. S. Robertson; S. E. Solomon; M. F. Sweeny  
Australia Dept. of Shipping and Transport, Canberra, A.C.T.  
HS-014 117, The Road Accident Situation in Australia,  
Canberra, 1972 p102-13  
1972 ;  
Availability: In HS-014 117

HS-014 123

## THE INSTITUTIONAL FRAMEWORK

The institutional framework of road safety in Australia is examined from the standpoint of it being a public issue. The division of responsibility (state and local governments) and national coordination are discussed along with the role of the Commonwealth of Australia, the Australian National Office of Road Safety, the creation of an advisory committee, low cost

improvement projects, the Commonwealth Aid Roads Act, and the development of national highways. Recommendations are offered for alleviating failures in the complicated transport system of Australia.

by C. L. D. Meares; J. A. Brabham; E. F. Campbell; P. J. Kenny; P. G. Pak-Poy; J. S. Robertson; S. E. Solomon; M. F. Sweeny  
Australia Dept. of Shipping and Transport, Canberra, A.C.T.  
HS-014 117, The Road Accident Situation in Australia,  
Canberra, 1972 p114-21  
1972 ;  
Availability: In HS-014 117

HS-014 124

## SUMMARY OF RECOMMENDATIONS

A summary of recommendations for improved Australian highway safety is presented, focusing on Commonwealth activities, road safety measures and studies. Aspects of government management and administration and of financial assistance are outlined. Road safety measures proposed deal with the road user, the vehicle, town planning and road design, traffic management, and the post-crash phase. These measures are grouped in two categories: those which, if implemented, would have an immediate effect in accident or injury reduction, or are necessary first steps to long-term benefits; and those which should be introduced progressively. Urgent and long-term study areas are suggested for each category.

by C. L. D. Meares; J. A. Brabham; E. F. Campbell; P. J. Kenny; P. G. Pak-Poy; J. S. Robertson; S. E. Solomon; M. F. Sweeny  
Australia Dept. of Shipping and Transport, Canberra, A.C.T.  
HS-014 117, The Road Accident Situation in Australia,  
Canberra, 1972 p122-31  
1972 ;  
Availability: In HS-014 117

HS-014 125

## STATISTICAL APPENDIX. BIBLIOGRAPHY. INDEX

A statistical appendix, a bibliography, and an index to a review of Australian highway safety are presented. Data are given on: road traffic accidents involving casualties, by states and territories, and by class of road user; road traffic accidents involving casualties, persons killed and injured, by type of accident, and by location of accident; road accident fatalities by class of road user and age; change in number of fatalities and number of injuries, by type of road user; change in number of accidents, road mileage, vehicle registrations, and driver/rider licenses, 1961 and 1971; estimated cost of accidents; and road accident fatalities by class of road user, sex, and age. A bibliography of 330 items is grouped by chapter subject as presented in The Road Accident Situation in Australia.

by C. L. D.Meares; J. A. Brabham; E. F. Campbell; P. J. Kenny; P. G. Pak-Poy; J. S. Robertson; S. E. Solomon; M. F. Sweeny  
Australia Dept. of Shipping and Transport, Canberra, A.C.T.  
HS-014 117, The Road Accident Situation in Australia,  
Canberra, 1972 p132-68  
1972 ; 330refs  
Availability: In HS-014 117

HS-014 126

#### **DRIVERS LICENSE GUIDE. U. S. A. AND CANADA. 1974 ED.**

A full-color drivers license reference manual is presented as a source of control information for several areas: field interrogations, traffic control and right-to-drive, credit card supportive identification, and general identity confirmation. Data are given for each state, all the Canadian Provinces, and Puerto Rico. Color photographs of both valid and invalid licenses in each jurisdiction are shown. Extension policies for military personnel are outlined and detection of fraudulent licenses is discussed. Credit card information is also given, along with descriptions of the SOUNDEX system for assigning license numbers to individuals. Updated 1974 data and illustrations of automobile registration plates are also provided.

by Anonymous  
Drivers License Guide Co., Redwood City, Calif.  
1973 ; 80p  
Availability: Corporate author

HS-014 127

#### **OPERATION REDESIGN: AXLES AND BRAKES FOR MVSS 121**

The detail known to affect the design of axles, brakes, wheels, and related equipment that will be used on air-braked vehicles under Federal Motor Vehicle Safety Standard (MVSS) 121 is discussed. The change is shown that is expected to occur on redesigned axle and braking equipment compatible with the higher levels of vehicle deceleration and controllability to satisfy the standard. Variables affecting vehicle brake performance and design and application problems related to MVSS 121 qualification are presented, such as consistency of foundation to brake output, wheel skid control devices, and tire-to-ground adhesion.

by C. F. Thornton  
Rockwell International Corp., Troy, Mich. Rockwell Standard Div.  
Rept. No. SAE-730697 ; 1973 ; 7p  
Presented at the SAE West Coast Meeting, Portland, Oreg. 20-23 Aug 1973.  
Availability: SAE

HS-014 128

#### **COMPARATIVE ANALYSIS OF AIR BRAKE ANTISKID SYSTEMS--A TRUCK BUILDER'S VIEW**

Air brake antiskid systems, each representing a unique approach to achieving a common goal and being promoted to fill the market created by the performance criteria contained in Federal Motor Vehicle Safety Standard (MVSS) 121, are discussed from a truck builder's viewpoint. Nine of these

systems were examined in order to determine the range of available features and performance, and to discover what new factors will have to be taken into account by vehicle manufacturers to accommodate antiskid systems as standard equipment. The early effective date of MVSS 121 has forced introduction of antiskid systems with only minimal field exposure. The next generation of system designs is already being considered, and is expected to incorporate refinements based on current experiences of skid control suppliers, vehicle manufacturers, and users.

by P. A. Turvill  
PACCAR, Inc., Bellevue, Wash.  
Rept. No. SAE-730698 ; 1973 ; 16p  
Presented at the SAE West Coast Meeting, Portland, Oreg. 20-23 Aug 1973.  
Availability: SAE

HS-014 129

#### **INTERMIXING OF TRACTORS AND TRAILERS EQUIPPED WITH EXISTING AND FMVSS 121 BRAKING SYSTEMS**

Service and emergency brake control and brake force input levels for pre- and post-Federal Motor Vehicle Safety Standard (MVSS) 121 tractors and trailers are compared, and some of the braking problems associated with the intermix of future and existing equipment are defined. A control and performance analysis of the existing plus the three basic MVSS 121 tractor systems operating in conjunction with the MVSS 121 trailer system and the existing trailer system indicates that combination control is not necessarily optimized under all conditions. A general upgrading of existing equipment is suggested to minimize performance or response disparities between intermixed vehicles.

by G. W. Stearns  
Wagner Electric Corp., St. Louis, Mo.  
Rept. No. SAE-730699 ; 1973 ; 15p 9refs  
Presented at the SAE West Coast Meeting, Portland, Oreg. 20-23 Aug 1973.  
Availability: SAE

HS-014 130

#### **CALIFORNIA VEHICLE INSPECTIONS--A BALANCED APPROACH**

California has combined the best features of the random and periodic methods of vehicle inspection in a multipronged attack on the operation of unsafe vehicles. Specially trained personnel of the California Highway Patrol conduct vehicle inspections at random locations throughout the state, at fixed commercial vehicle inspection facilities, and at fleet owners' terminals to ensure compliance with statutory regulations. As a result of this balanced approach, the California motorist is provided with a quality vehicle inspection without economic hardship.

by D. L. Gibson  
California Dept. of Hwy. Patrol, Sacramento  
Rept. No. SAE-730705 ; 1973 ; 6p 2refs  
Presented at the SAE West Coast Meeting, Portland, Oreg. 20-23 Aug 1973.  
Availability: SAE

HS-014 181

### **A THREE YEAR COMPARISON OF ALCOHOL RELATED DRIVING BEHAVIOR IN WASHTENAW COUNTY, MICHIGAN**

Three roadside surveys of drivers in Washtenaw County, Michigan were conducted in March of 1971, 1972, and 1973 as part of the evaluation procedures for the Washtenaw County Alcohol Safety Action Program and surveying nighttime driving residents. Forty-eight time-location cells were defined throughout the county based on time of night, day of week, traffic volume, and location. A short on-site interview was obtained from participating drivers as well as a breath specimen used to determine blood alcohol concentration (BAC). It is shown that the proportion of drivers with measurable BAC decreased each year, from 19% (of a 748-driver sample) in 1971 to 15% (of 847) in 1973. Over the same period, the proportion of drivers with BAC of .05 or higher decreased from 10% to 8%.

by C. D. Clark; M. J. Compton; R. L. Douglass; L. D. Filkins  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Contract Ref: FH-11-7535  
HIT Lab Reports v3 n2 p1-14 (Oct 1973)  
1973 ; 5refs  
Sponsored by the Washtenaw County Health Department, Mich.  
Availability: See serial citation

HS-014 182

### **NEW YORK STATE ACCIDENT FACTS. AN ILLUSTRATED ANALYSIS OF 1972 ACCIDENT RECORDS**

An analysis of 1972 accident records is presented in both graphic and statistical format. Subject areas covered include, in part: death and injury; age factors in fatalities; time of day and road conditions when accidents occurred, and the New York accident statistics. The percentage of change between 1971 and 1972 statistics in selected areas is shown, and a twenty-year summary (1953-1972) covers accident injuries and fatalities, estimated populations, vehicle registration and estimated miles of vehicle travel.

New York State Dept. of Motor Vehicles, Albany  
1973 ; 36p  
Availability: Corporate author

HS-014 183

### **ROAD HUMPS FOR THE CONTROL OF VEHICLE SPEEDS**

The suitability and effectiveness of humps for alerting drivers and controlling vehicle speeds is examined. Seven vehicles including private cars, goods vehicles, a moped and a bus were used in the tests and six subjects estimated the noticeability and discomfort of the different humps at various crossing

speeds. Two main classes of humps were studied: short humps which could be straddled by the wheels of most vehicles and long humps which could be straddled only by some large vehicles. The humps ranged from 2 in. to 12 ft. long and 0.5 in. to 6 in. high. Increasing the height of short humps beyond 1.5 in. introduced safety problems such as the risk of loss of control or of vehicle damage by grounding, and increased the severity of impact on tires and suspension. Increasing the length of a hump tended to reduce the hazard, and a hump 12 ft. long and 4 in. high showed promise for controlling vehicle speeds, although caution is advocated.

by G. R. Watts  
Transport and Road Res. Lab., Crowthorne, Berks., (England)  
Rept. No. TRRL-LR-597 ; 1973 ; 42p 2refs  
Availability: Corporate author

HS-014 184

### **AUTOMOTIVE SAFETY ENGINEERING SEMINAR, JUNE 20-21, 1973. PROCEEDINGS**

The areas of responsibility of the General Motors Environmental Activities Staff are vehicle emissions, automotive safety, vehicular noise control, plant and environmental engineering, and quality assurance. The purpose of this seminar was to provide a forum for discussion of this broad area of public opinion with the intention of a free exchange of views, a presentation of varying perspectives of the subjects, and to encourage dialogue on problems and progress. All speakers were authorities in their fields of interest, and topics selected for discussion were highway safety progress, safety priorities, accident avoidance, occupant protection and future safety research needs. Up-to-date, state-of-the-art information exchange in many areas of interest proved very beneficial.

by Anonymous  
General Motors Corp., Warren, Mich. Environmental Activities Staff  
1973 ; 200p refs  
Availability: Corporate author

HS-014 185

### **VEHICLE VISION AND HIGHWAY SAFETY: AN OVERVIEW SINCE 1962**

Highway safety is reviewed with regard to the emergence of vision as an important safety factor. The importance of driver vision tests, roadway design, and vehicle design needs are stressed. Recommendations are offered for improvements, and new vision research findings that relate to vehicle and highway design are included. Research is cited on eye camera studies, and lighting instrument panel and rear vision studies. Highway improvements include signing, lighting, and edgemarking.

by P. L. Connolly  
 HS-014 184, Proceedings of Automotive Safety Engineering  
 Seminar, June 20-21, 1973, Warren, Mich. p75-83  
 1973 ; 13refs  
 Availability: In HS-014 184

HS-014 186

### **THE UTILIZATION OF TECHNOLOGY TO IMPROVE FUTURE AUTOMOTIVE SAFETY**

The impact of technology on automotive safety is discussed, with emphasis on three pertinent areas: simulation, automotive recorders, and data systems. The potential applications and inherent advantages and disadvantages of simulation are examined along with planned applications of simulation techniques by NHTSA, including their possible impact on future automotive safety. The automotive recorder is studied in terms of purpose, development, fleet selection, installation, data, and the impact of this data on future automotive safety. Data systems address the problems encountered when a dearth of data exists. Discussion focuses on data system design and implementation, data collection, data analysis, and the impact on future automotive safety.

by G. G. Mannella  
 HS-014 184, Proceedings of Automotive Safety Engineering  
 Seminar, June 20-21, 1973, Warren, Mich. p165-71  
 1973 ; 7p  
 Availability: In HS-014 184

HS-014 187

### **ALTERNATIVES TO THE CONVENTIONAL ENGINE: HYDROGEN POWER FOR CARS**

The use of hydrogen power for automobiles is examined with emphasis on its ecological benefits. Early and recent research with hydrogen is reviewed, including hydrogen-air conversions developed at various universities as student projects for entry in the Urban Vehicle Design Competition. Difficulties cited include storage problems with liquid hydrogen. Methods for fueling a hydride-powered car are described. A possible interim solution is suggested by an on-board hydrogen generator system for internal combustion engines which would produce hydrogen as needed and feed it into very lean fuel-air mixtures to reduce exhaust emissions. Safety and economic considerations are also discussed.

by J. Dinkel  
 Road and Track v25 n7 p63-7 (Mar 1974)  
 1974 ;  
 Availability: See serial citation

HS-014 188

### **VISIBLE DISTANCE AND VISUAL GUIDANCE AS A FUNCTION OF SYSTEM ANGLE OF POLARIZED HEADLIGHT SYSTEMS**

Since one of the problems with polarized headlights is the choice of optimal polarization angle between headlight polarizer and visor, three system angles, 00, 450, and 900, are compared with regard both to visibility of the road and to visibility of obstacles on the road. The road situation is simulated in the laboratory and the results obtained are compared and validated in a full scale field study. The results show that the 00 angle

gives the best visibility of obstacles on the road. The road visibility is not quite as simple a function of angle, but generally it is found that this angle is the optimal polarization angle between headlight polarizer and visor.

by G. Helmers  
 Uppsala Univ. (Sweden). Dept. of Psychology  
 Rept. No. R-126 ; 1972 ; 62p 9refs  
 Sponsored by the Official Swedish Council for Road Safety Research.  
 Availability: Corporate author

HS-014 189

### **CHANGING CHARACTERISTICS OF HIGH ACCIDENT DRIVERS OVER A FIVE YEAR PERIOD. FINAL REPORT**

The number and characteristics of drivers who had a high accident involvement during a particular year were determined along with changes in their characteristics and accident involvement during the following four year period. Driver and accident record summaries were obtained for 776 drivers, and an additional 1288 drivers were studied for whom only accident records were collected. It was found that the accident records of most of the drivers studied exhibited much improvement during the four-year followup period. Using only information from the record files, it was found that it is difficult to predict with any degree of accuracy which drivers who were high accident drivers during a particular year would continue to be excessive accident repeaters. Two characteristics which appeared to have the greatest prediction value were the number of accidents during a year and the type of license, such as public passenger chauffeur's licenses.

by J. E. Goodson  
 Joint Hwy. Res. Proj., Lafayette, Ind.  
 Rept. No. JHRP-29 ; 1972 ; 129p 42refs  
 Availability: Corporate author \$5.00

HS-014 190

### **A METHOD OF ESTIMATING THE DISTRIBUTION OF SPEEDS OF CARS ON MOTORWAYS**

A method of estimating the distribution of speeds of cars at an average point on a length of motorway or other dual carriageway, developed from Wardrop's moving-observer method of estimating journey times, is described. It is assumed that the speeds are normally distributed, but it is shown that considerable departure from normality can be tolerated. The method consists of making several test-car runs at each of two different constant speeds, and counting the numbers of overtaking cars (overs) and cars overtaken (unders). The unders-to-overs ratio at each speed is plotted on an analysis diagram, which then shows the mean speed, the standard deviation of speed, and the main percentage points of the speed distribution.

by N. C. Duncan  
Transport and Road Res. Lab., Crowthorne, Berks. (England)  
Rept. No. TRRL-LR-598 ; 1973 ; 26p 7refs  
Availability: Corporate author

HS-014 191

# **DYNAMIC BEHAVIOUR OF A SINGLE AXLE VEHICLE SUSPENSION SYSTEM: A THEORETICAL STUDY**

The dynamic behavior of a simple vehicle model when it passes over various types of road surface irregularity is investigated theoretically. The effect of varying the model's parameter values on the dynamic loads applied to the road and on accelerations experienced by the vehicle body is also examined. The initial peak dynamic loads are shown to be most sensitive to changes in tire stiffness and in sprung mass; subsequent peaks are particularly sensitive to changes in suspension viscous damping. The first peak of acceleration of the vehicle body is shown to be particularly sensitive to changes in spring mass, spring stiffness, tire stiffness, and suspension viscous damping. A non-linear spring is shown to be able to reduce accelerations experienced by the body when the vehicle is unladen, with little change in accelerations when the vehicle is laden.

by J. Page  
Transport and Road Res. Lab., Crowthorne, Berks. (England)  
Rept. No. TRRL-LR-580 ; 1973 ; 31p 12refs  
Availability: Corporate author

HS-014 192

# **LARGE VEHICLE-INDUCED AERODYNAMIC DISTURBANCES. CRITIQUE OF PAST STUDIES AND RECOMMENDATIONS FOR FURTHER RESEARCH. FINAL REPORT**

A critique and evaluation of research on large vehicle-induced aerodynamic disturbances are presented. Existing analysis shows that accidents only occur under the most obvious disturbance circumstances, yet, severe accidents have been reported with no apparently obvious reasons. The type of vehicle dynamics model used in previous studies lacked certain aerodynamic stability derivatives. This can be important for large aerodynamic force-to-weight ratio foreign and domestic cars. Moreover, existing driver models allow for a wide range of driver competence, thus tending to mask effects of aerodynamic disturbances. Aerodynamic disturbances, which are inputs to the vehicle/driver model, are ill-defined and poorly understood. Comparisons of vehicle/driver/aerodynamic disturbance model tests to full scale test data show wide discrepancies. The final conclusion reached is that additional experimental and analytical work is required to resolve discrepancies in previously gathered experimental data, and to extend the state-of-the-art in such a way as to allow the formulation of cost effective aerodynamic hazard reduction strategies.

by N. P. Trentacoste  
JRB Associates, Inc., Arlington, Va.  
Rept. No. JRB-73-119-AR; PB-222 894 ; 1973 ; 34p 36refs  
Funded by FHWA purchase order no. 3-1-1471.  
Availability: NTIS

HS-014 193

# **CHARACTERISTICS OF FREEWAY TRAFFIC AND OF FREEWAY LANE-CHANGING BEHAVIOR**

Important freeway traffic characteristics are given based on an analysis of aerial photographic data obtained on the Long Island Expressway and the Ventura and Santa Ana freeways. The characteristics include distributions of time headway, time speed, space headway, space speed, and space relative speed, and bivariate histograms of space speed and relative space speed with space headways. This information was obtained for every lane and for various levels of traffic service and is presented both in graphical and in summary table forms. An account is also given of the nature of various traffic characteristic distributions, and the bivariate histograms are related to safe driving rules. Microscopic aspects of lane-changing behavior obtained from the Long Island data are reported. Discussions and summary statistics were made for the speeds, space headways, and relative speeds of the lane-changing vehicle and its neighboring vehicles. Three risk criteria were applied that provided hazard measures of lane changes.

by P. K. Munjal; Y. S. Hsu  
Highway Research Record n453 p10-27 (1973)  
1973 ; 10refs  
Availability: See serial citation

HS-014 194

# **EXPERIMENTAL VALIDATION OF LANE-CHANGING HYPOTHESES FROM AERIAL DATA**

The linear model of lane-changing by Gazis, Herman, and Weiss, the nonlinear model by Oliver and Lam, and the stochastic model by Worrall, Bullen, and Gur are examined to evaluate the validity of these models by using aerial photograph data. Unknown parameters of the linear and nonlinear models, as well as the probability transition matrix of the stochastic model, are estimated by using the experimental data. Some statistical analyses are carried out to measure their validity.

by P. K. Munja; Y. S. Hsu  
Highway Research Record n456 p8-19 (1973)  
1973 ; 12refs  
Availability: See serial citation

HS-014 195

# **CURB-GUARDRAIL VAULTING EVALUATION**

Impact evaluations are presented for several curb-guardrail combinations, carried out by conservatively assessing the possibility that a vehicle will vault a guardrail after it impacts a curb. Three parameters are examined: approach velocity, approach angle, and guardrail setback from the curb face. Vaulting analyses are carried out by using curb-impact simulation data as input to an analytically derived vaulting equation. All curb-guardrail combinations subjected to evaluation were found to be free of potential vaulting problems. A review of

all known curb-guardrail tests shows no identifiable cases of vaulting by standard passenger-car test vehicles. A review of curb-guardrail use and the development of optimized curb-guardrail configurations are recommended.

by D. F. Dunlap  
Highway Research Record n460 p10-9 (1973)  
1973 ; 13refs  
Sponsored by the Michigan Dept. of State Highways and the Federal Hwy. Administration. Financed under the Highway Planning and Research Program.  
Availability: See serial citation

HS-014 196

### **ENERGY-ABSORBING CORRUGATED METAL HIGHWAY BUFFER**

A new concept in energy-absorbing highway buffers was developed and tested with scale models. The buffer is made of corrugated-metal elements that deform plastically on impact and absorb the energy of the impacting vehicle. The buffer has a parabolic shape to form a gradual transition between an energy-absorbing buffer for frontal impacts and an energy-absorbing guardrail for glancing, side impacts. The model buffer was found to perform well in a variety of situations including head-on, angled, and glancing impacts. Scale-model testing was found to be a valuable tool; tests were conducted for a small fraction of the cost and time of full-scale tests. Additional scale-model tests and some full-scale tests will need to be conducted before the design is completed.

by R. J. Fay; M. A. Kaplan  
Highway Research Record n460 p20-9 (1973)  
1973 ; 2refs  
Funded by the Colorado Dept. of Highways.  
Availability: See serial citation

HS-014 197

### **MATHEMATICAL MODEL FOR IMPACT TESTS ON CRASH BARRIERS**

A computer program that simulates impacts of various vehicles with guardrail barriers is described as a digital simulation system, making use of several mathematical models. The vehicle simulation is composed of three major segments: the vehicle as a rigid body, the steering gear, and the deformation of the body due to the impact. The barrier is a structured beam on many flexible supports, divided into a certain number of elements connected to each other at the nodes. The vehicle and barrier work in several combinations: dynamics of the vehicle alone before impact when the barrier is motionless and undeformed; dynamics of the vehicle and the barrier exerting forces on each other after impact; dynamics of the vehicle and barrier not exerting forces on each other when they have no contact and the barrier oscillates because of inertia; and dynamics of the vehicle alone when there is no contact with the barrier.

by V. Giavotto  
Highway Research Record n460 p49-60 (1973)  
1973 ; 5refs  
Sponsored by the Institute for Road Safety Research, Netherlands.  
Availability: See serial citation

HS-014 198

### **TRUCK TESTS ON TEXAS CONCRETE MEDIAN BARRIER**

The Texas concrete median barrier, with inclined surfaces, satisfactorily restrained and redirected a large 48,000-lb tractor-trailer truck with load under the full-scale impact test conditions of 35 mph at a 190 angle, 34 mph at a 160 angle, and 45 mph at a 150 angle. The truck was remotely controlled from a chase pickup vehicle. There was damage to the sheet metal of the front fender and running board of the tractor. Estimated repair costs was less than \$200. Maintenance of the barrier would require, at most, a light sandblasting job to remove the tire scrub markings. The small amount of concrete spalling that occurred in the immediate area of impact would require no maintenance. The fence and light pole on top of the barrier were not damaged.

by E. R. Post; T. J. Hirsch; J. F. Nixon  
Highway Research Record n460 p73-81 (1973)  
1973 ; 5refs  
Availability: See serial citation

HS-014 199

### **VEHICLE CRASH TEST AND EVALUATION OF MEDIAN BARRIERS FOR TEXAS HIGHWAYS**

Full-scale tests were conducted to evaluate and compare the performance of three Texas median barriers of different configuration and lateral stiffness: the semirigid metal beam guard fence (two back-to-back steel W-beam guardrails on breakaway steel posts); the relatively rigid E-3 (two different sizes of strong elliptical steel rail members mounted on strong fabricated steel posts); and the rigid concrete median barrier with inclined faces. All three restrained and redirected a standard-sized 4000-lb passenger vehicle under the severe impact conditions of about 60 mph and 250. Snagging occurred on a post of the E-3 barrier. The semirigid fence barrier is initially least expensive and safest for occupant injury, but is the most costly to repair and is not suitable in narrow medians. The rigid median barrier is the most economical overall.

by E. R. Post; T. J. Hirsch; G. G. Hayes; J. F. Nixon  
Highway Research Record n460 p97-113 (1973)  
1973 ; 6refs  
Availability: See serial citation

HS-014 200

### **METHOD FOR PREDICTING TRAVEL TIME AND OTHER OPERATIONAL MEASURES IN REAL-TIME DURING FREEWAY INCIDENT CONDITIONS**

A method for predicting the travel time required by a motorist to travel from any selected freeway location to the end of the freeway system during incident conditions is described. It is predictive in that it computes an estimate of a motorist's travel time if he were to enter the freeway several minutes in the fu-

ture. Speeds, volumes, and other operational measures can also be predicted. These calculations are made immediately after the incident is detected and the necessary operational measures have been evaluated. Speeds of the various shock waves and travel time results are presented. The model was developed following the kinematic wave theory of Lighthill and Whitham for possible use in an operational control strategy of variable-message signs whereby motorists would be diverted to alternate routes. The model could also be used to predict queue backups and delays due to lane closures.

by C. J. Messer; C. L. Dudek; J. D. Friebele  
Highway Research Record n461 p1-16 (1973)  
1973 ; 17refs

Includes discussion by R. L. Gordon, J. A. Wattleworth, and E. F. Reilly, and author's closure. Sponsored by the HRB Committee on Effectiveness of Operational Measures and the Texas Highway Dept. in cooperation with the Federal Hwy. Administration.  
Availability: See serial citation

HS-014 201

### **CORRELATING INSTRUMENTED CAR RESPONSES WITH CERTAIN GEOMETRIC ELEMENTS OF HIGHWAYS AND ACCIDENTS UTILIZING SHORT SECTION ANALYSIS**

An analysis procedure is presented for determining the significant changes in instrumented car responses on adjacent short sections of a highway. The sections on which significant responses occur are then correlated by and with highway geometry elements, intersections and grades, and the number of accidents per short section. Values were calculated by a least squares method for each driver response as measured by car instruments for a specified short section, and were then compared sequentially for significant change by using an F-test. Those sections in which significant change was found were correlated on a binary basis with the intersections, grades of more than 4%, and accidents. Correlation coefficients were calculated for six different lengths of section. The highest correlations were found between accidents and those significant change sections whose instrumented car responses were speed change, running time, and total time. Significant driver responses did not correlate highly with intersections or grades.

by L. B. West, Jr.; C. L. Heimbach  
Highway Research Record n461 p17-29 (1973)  
1973 ; refs

Sponsored by the Committee on Effectiveness of Operational Measures.  
Availability: See serial citation

HS-014 202

### **DRIVER RISK-TAKING: THE DEVELOPMENT OF A DRIVER SAFETY INDEX**

A methodology to classify automobile drivers according to their risk acceptance decisions, visual perception capabilities, and driving skills is presented. A drive-through gap situation was used to develop and experimentally investigate the concept of the driver safety index, based on the assumption that a driver's safety distance between the mean of his psychometric risk-acceptance function and the mean of psychometric visual perception function for a gap is a representative measure of his risk taking behavior. Experimentally obtained values in-

dicate that the methodology seems sensitive and successful in detecting differences among the four drivers tested. The drivers who exhibited either rather large or small values under a given set of experimental conditions exhibited similar values under a different set of experimental conditions.

by H. T. Zwahlen  
Highway Research Record n464 p1-12 (1973)  
1973 ; refs

Sponsored by the Committee on Road User Characteristics.  
Availability: See serial citation

HS-014 203

### **EXPERIMENTAL MEASUREMENTS OF PERCEPTUAL THRESHOLDS IN CAR-FOLLOWING**

A series of experiments studied perceptual thresholds of drivers in car-following. By means of an occlusion device, subjects seated as passengers in a following car traveling at 45 mph were given controlled looks, normally of 4-sec duration, at a lead car moving at a constant speed. For each exposure the subjects indicated whether they perceived negative (the cars came closer) or positive relative motion. The results indicate that the dominant cue used to judge the sign of relative motion is the average value of relative speed divided by spacing, there is response bias in favor of indicating negative rather than positive relative motion, and there is a high level of sensitivity to relative motion.

by L. Evans; R. Rothery  
Highway Research Record n464 p13-29 (1973)  
1973 ; 22refs

Sponsored by the Committee on Road User Characteristics.  
Availability: See serial citation

HS-014 204

### **SKID SIMULATOR FOR USE IN DRIVER TRAINING AND RESEARCH**

A vehicle skid simulator is described which will provide a laboratory model of a skidding automobile in which the driver can experience the visual inputs and the yaw motions and learn how best to use the brake pedal, accelerator, and steering wheel to control his vehicle. The simulator rotates about a pivot point at the center of gravity of the skidding vehicle. The driver is placed in a potential skidding situation and told to keep the vehicle centered in a simulated lane. Manipulations of the controls are converted into voltages by transducers and fed into an analog computer programmed to represent the yaw responses of an actual automobile on various types of surfaces. The simulator will be used for research to define the characteristics of control and skidding and to determine the potential for skid training; and will be useful in studying human factors aspects of motion and acceleration effects of perception.



June 27, 1974

HS-014 210

by R. A. Olsen  
Highway Research Record n464 p30-4 (1973)  
1973 ; 8refs  
Sponsored by the Committee on Simulation of Driving Task.  
Availability: See serial citation

Automotive Engineering v82 n2 p50-7 (Feb 1974)  
1974 ; 2refs  
Availability: See serial citation

HS-014 205

### **AUTOMOTIVE ENGINEER'S GUIDE TO DIGITAL ELECTRONICS**

The basic building blocks of digital circuits and how they are used in integrated circuits for automotive applications are described. Digital logic elements and performance characteristics, and integrated circuits in general are considered. Automotive applications of the digital circuits include aspects of safety, pollution controls, automotive diagnostics, accessories, and performance. Problems and outlook are assessed.

Automotive Engineering v82 n2 p32-7 (Feb 1974)  
1974 ; 1ref  
Availability: See serial citation

HS-014 208

### **PREVENTING GALVANIC CORROSION**

Galvanic corrosion and factors inducing it are described, and design guides for preventing and minimizing its costly effects are given. It is suggested that multiple approaches may be necessary to minimize the corrosion, such as selecting materials compatible with aluminum, insulating the metals, and excluding the environment by use of sealers, tapes, organic coatings, and metallic coatings. Design tips are offered, focusing on the ratio of the area of the cathode to that of the anode. Cathodic protection is considered along with successful cladding.

Automotive Engineering v82 n2 p40-5 (Feb 1974)  
1974 ; 1ref  
Availability: See serial citation

HS-014 206

### **ALUMINUM VS STEEL FOR AUTO BODIES**

An analysis of welding and other manufacturing problems involved in changing an auto body from steel to aluminum is presented, and a summary of weight gains that might result in high volume production is given. Strength requirements for automobiles are described and methods of determining weld strength are shown. Further discussion is given to dent resistance factors, the aluminum forming process, resistance welding, body filling and finishing, and weight comparisons.

Automotive Engineering v82 n2 p27-31 (Feb 1974)  
1974 ; 1ref  
Availability: See serial citation

HS-014 209

### **COMING CLOSER: RADAR BRAKING FOR AUTOMOBILES**

Radar braking systems, seen as an emergency back-up system to conventional driver control, are described. Two separate concepts are discussed. The first uses conventional radar bounce to identify objects and then seeks, through technical refinement, to eliminate such problems as false alarms, cross-talk between systems, and weather-related errors. The second concept proposes to tag potential threats with a special, frequency-doubling reflector.

Automotive Engineering v82 n2 p61-6 (Feb 1974)  
1974 ; 2refs  
Availability: See serial citation

HS-014 207

### **U. S. STEEL AND GM REVEAL ENERGY ABSORBER ADVANCES. STEEL CABLE BUMPER DECELERATOR**

Specifications are given for two energy absorber advances. A new concept developed by U. S. Steel for bumper energy absorption is described in which impact energy is absorbed transverse to vehicle. A steel cable is anchored to the rear portion of the bumper outward of the frame, passes over the ends of the frame, and connects to the centrally mounted energy absorber--a disc brake in this system--dissipating the impact energy through frictional heat. The bumper is not physically affixed to the frame. Components, testing, and advantages of the system are described. General Motors studies are examined which establish energy absorber rebound performance characteristics, and their hydraulic pneumatic absorber, modified to provide rebound control on some 1974 models, is discussed.

HS-014 210

### **MEDICAL IMPAIRMENT TO DRIVING**

Various medical factors affecting driving ability and highway safety are reviewed. Separate chapters are provided on: driver licensing--philosophy, criteria, and methods; current knowledge about medical conditions and highway crashes; identification of drivers with medical handicaps; evaluation of medical impairment to driving; epilepsy; cardiovascular diseases; diabetes mellitus; alcoholism and problem drinking; mental illness; drug use and addiction; factors associated with youth and aging; other conditions; specialized driving tasks.

HS-014 211

by J. A. Waller  
Vermont Univ., Burlington  
by Charles C. Thomas, Springfield, Ill., \$7.50 (cloth), \$4.96 (paper)  
1973 ; 95p 96 refs  
Includes HS-014 211--HS-014 223.  
Availability: Publisher

HS-014 211

### **DRIVER LICENSING--PHILOSOPHY, CRITERIA AND METHODS**

The goal of driver licensing is to license only those individuals who are consistently able to avoid creating demanding situations and who also are consistently able to cope with demands placed upon them from outside. An attempt is made to identify groups of persons who do not meet this vague criteria, and to explore the methods and likelihood of accurately identifying the individuals within these groups either at the time of the initial licensing or at some time after the license has been issued. Considered in an attempt to identify drivers who require special licensing approaches are unskilled persons, inexperienced persons with basic skills, those with skills and experience who create demanding situations, and persons who lack spare capacity to respond effectively to demanding driving situations.

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving, Charles C. Thomas, Springfield, Ill., 1973 p5-15  
1973 ; 8refs  
Presented at session on driver licensing, Annual Meeting, Highway Research Board, Washington, D.C., 23 Jan 1973.  
Availability: In HS-014 210

HS-014 212

### **CURRENT KNOWLEDGE ABOUT MEDICAL CONDITIONS AND HIGHWAY CRASHES**

The effect of medical factors on highway accidents and programs to regulate impaired drivers are discussed. The basis of such regulation programs focuses on the crash risk associated with a particular condition, the proportion of drivers with the condition, the proportion of crashes attributable to the condition, the relative advantages and disadvantages of particular methods for regulating this group of drivers, and alternatives to the regulation of drivers. The most feasible alternatives include simplifying the driving task through improvements of vehicle and roadway design, reducing the lethal consequences of crashes by developing more effective restraint systems, reducing roadside obstacles and the possibilities for head-on crashes, and improving emergency health services.

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by J. A. Waller  
Vermont Univ., Burlington  
1973 ; 4refs  
Availability: In HS-014 210

HS-014 213

### **IDENTIFICATION OF DRIVERS WITH MEDICAL HANDICAPS**

The three criteria which should be applied to the selection of methods for identifying high risk drivers are: the method should be relatively inexpensive and uncomplicated; it should identify a major portion of the high risk drivers in the category being examined; and it should avoid identifying drivers who do not have an increased crash risk. Methods for identification currently in use are discussed and the 1966 California regulation on reportable diseases and conditions is discussed.

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving, Charles C. Thomas, Springfield, Ill., 1973 p22-25  
1973 ; 8refs  
Availability: In HS-014 210

HS-014 214

### **EVALUATION OF MEDICAL IMPAIRMENT TO DRIVING**

Medical impairments which may affect ability to drive are conditions which alter perception because of loss of consciousness, or limitation of a single sense; conditions which alter judgemental processes in reactions; and motor conditions which limit one's ability to respond rapidly to changes in traffic environment. For proper evaluation of driving ability of affected persons there should be a three way communication between the licensing agency, the driver and his physician. Recommended standards and a driver medical evaluation form are given.

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving, Charles C. Thomas, Springfield, Ill., 1973 p26-34  
1973 ; 8refs  
Availability: In HS-014 210

HS-014 215

### **EPILEPSY**

The prevalence of and clinical manifestations of epilepsy are described and related to driving impairment. The role of electroencephalography in the diagnosis of epilepsy is examined along with methods of treatment. Control of drivers with epilepsy in relation to their crash risk is studied, with controversies noted regarding licensing procedures and risk prediction. The effect of alcohol on epileptic drivers is also considered.

June 27, 1974

HS-014 221

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving. Charles C.  
Thomas, Springfield, Ill., 1973 p35-42  
1973 ; 5refs  
Availability: In HS-014 210

HS-014 216

## CARDIOVASCULAR DISEASES

Four major categories of conditions are discussed which often occur in combination. They include diseases of the heart, cerebral vascular disease (stroke), hypertension (high blood pressure), and disease of specific blood vessels in arms, legs, or elsewhere. Department of Health, Education and Welfare recommendations for licensing such drivers are outlined.

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving. Charles C.  
Thomas, Springfield, Ill., 1973 p43-53  
1973 ; 11refs  
Availability: In HS-014 210

HS-014 217

## DIABETES MELLITUS

Clinical aspects of diabetes mellitus are described along with its complications which are of concern to driver licensing personnel. These include insulin or hypoglycemic reactions, arterosclerotic disease, and impaired vision. Recommendations are offered for licensing restrictions in each case.

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving. Charles C.  
Thomas, Springfield, Ill., 1973 p54-56  
1973 ; 5refs  
Availability: In HS-014 210

HS-014 218

## ALCOHOLISM AND PROBLEM DRINKING

The pharmacologic effect of alcohol and its relationship to driving ability is given along with characteristics of problem drinkers. It is noted that in a substantial majority of highway crashes involving alcohol, the blood alcohol concentration is 100 mg/100 ml or higher. Personality characteristics, attitudes, and alcohol usage habits of problem drivers are reviewed. Physiological and clinical, behavioral, psychological, and attitudinal criteria prepared by the National Council on Alcoholism for identification of problem drinking are given. Evaluation and regulation of drinking problems are discussed, and recommendations are made for driver license revocation.

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving. Charles C.  
Thomas, Springfield, Ill., 1973 p57-65  
1973 ; 11refs  
Availability: In HS-014 210

HS-014 219

## MENTAL ILLNESS

Emotional illness as it affects driving ability and accident risk is discussed. A brief summary of the major classical types of mental illness in adults is presented, including schizophrenia, affective or manic-depressive disorders, character disorders or sociopathic personality patterns, psychoneuroses, alcoholism, and senile psychoses. The characteristics of paranoid thinking, suicidal tendencies, impulsiveness, and violent or aggressive behavior against others are cited as important factors in evaluating crash risk. Procedures for possible driver license revocation are suggested.

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving. Charles C.  
Thomas, Springfield, Ill., 1973 p66-71  
1973 ; 9refs  
Availability: In HS-014 210

HS-014 220

## DRUG USE AND ADDICTION

Differences between the casual drug user and the addict as they relate to driving performance and accidents, are studied. Effects of marijuana, barbiturates, tranquilizers, hallucinogens such as lysergic acid diethylamide (LSD) and glue sniffing are considered, as well as amphetamines, speed, and benzydrene. The possible effect on driving skills of other drugs, used for medical treatment, is also considered. These studies do not support the contention that, in general, the use of drugs other than alcohol either legally or illegally seriously reduces driving skill. The studies do not reject the argument that in some instances the use of a drug may contribute to the occurrence of a crash.

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving. Charles C.  
Thomas, Springfield, Ill., 1973 p72-75  
1973 ; 6refs  
Availability: In HS-014 210

HS-014 221

## FACTORS ASSOCIATED WITH YOUTH AND AGING

The processes of aging and their effect on driving ability among both the young and the old are discussed. It is noted that drivers in both groups have a higher crash risk per mile than among middle aged drivers. Psychological and developmental factors associated with the process of maturing appear to explain this risk among the young drivers; among older drivers, physiologic factors seem to predominate. Driver behavior modification methods are reviewed along with suggestions for dealing with senile deteriorations such as visual impairment.

HS-014 222

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving. Charles C.  
Thomas, Springfield, Ill., 1973 p76-78  
1973 ; 11refs  
Availability: In HS-014 210

HS-014 222

### OTHER CONDITIONS

Various chronic or recurring conditions which may affect driving ability are discussed. These include reduced vision and hearing, conditions affecting coordination and mobility, narcolepsy, certain respiratory and endocrine disorders, extreme obesity, and conditions causing general discomfort. Most persons reported with these conditions can be handled by using a common sense approach or by referral to a medical advisory committee.

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving. Charles C.  
Thomas, Springfield, Ill., 1973 p79-81  
1973 ; 12refs  
Availability: In HS-014 210

HS-014 223

### SPECIALIZED DRIVING TASKS

Two types of special driving tasks are discussed: operation of trucks, buses, or other heavy equipment or of other commercial vehicles carrying passengers; and operation of emergency vehicles. It is noted that medical evaluation of all commercial drivers is warranted because of the smaller number of drivers involved and because the implications, should a crash occur, are more serious. They also have greater exposure to the road, may have to drive for longer periods, under more adverse conditions, and may have to carry out additional tasks such as loading and unloading. The hazards of increased noise exposure are cited. Recommendations are offered for modifications of medical standards for these drivers.

by J. A. Waller  
Vermont Univ., Burlington  
HS-014 210, Medical Impairment to Driving. Charles C.  
Thomas, Springfield, Ill., 1973 p82-84  
1973 ; 3refs  
Availability: In HS-014 210

HS-014 224

### A DRIVING SIMULATION STUDY TO DETERMINE INFORMATION LEAD DISTANCE REQUIREMENTS FOR AN ELECTRONIC ROUTE GUIDANCE SYSTEM. FINAL REPORT

Results are presented of a driving simulation study to determine driver performance in negotiating 22 simulated urban intersections using an Electronic Route Guidance System (ERGS) display to present routing information through the intersections. The effect of ERGS display information lead distance (ILD) upon driver performance, under various environmental conditions with drivers of varying ages, and the determination of optimal ILD's for each intersection were the primary study considerations. The results indicated that driver

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performance is influenced by ILD, but few environmental or age factors interact with ILD to influence performance; and that optimal ILD is not primarily a function of distance, but depends heavily on intervening side road location and the type of ERGS message given. Recommended optimal ILD's are given for 30 intersection traces and general rules for optimal ILD generation are presented.

by C. L. Shaffer; M. Kirkpatrick; W. M. Breda  
North American Rockwell Corp., El Segundo, Calif.  
Contract FH-11-7338  
Rept. No. NR-70H-167; PB-212 098 ; 1970 ; 410p 26refs  
Availability: NTIS \$21.50

HS-014 225

### ACCIDENT EXPERIENCE WITH IMPACT ATTENUATION DEVICES. FINAL REPORT

A summary and analysis are given of the field accident data from 393 accidents at 188 installations of six types of impact attenuators. Attenuators studied were: the Fitch Inertial Barrier; a sand-filled frangible plastic container; the Hi-Dro Cushion, a cylindrical vinyl cartridge that expels water on impact; the steel drum, an assembly of 55-gallon drums with controlled impact resistance; the Tor-Shok which absorbs impact energy by the motion of supporting telescopic tubes; the Drag-net, a steel entrapping net placed across the roadway; and the vermiculite concrete barrier, made of easily frangible material with vertical voids providing controlled crushing. Conclusions are: impact attenuators are effective in reducing accident injury and damage severity; vehicle overturns are low in impact attenuator accidents; nuisance hits on attenuators may be reduced by public education and redesign of gore areas; all attenuator sites must be actively patrolled so that damaged ones may be restored to operational status; and impact attenuators are cost effective.

by J. G. Viner; C. M. Boyer  
Federal Hwy. Administration, Washington, D. C.  
Rept. No. FHWA-RD-73-71; PB-224 995 ; 1973 ; 43p 12refs  
Data reported by the states under the National Experimental and Evaluation Prog. Proj. No. NEEP-4, Impact Attenuator Devices.  
Availability: NTIS

HS-014 226

### FACTS ON MOTOR VEHICLE CRASHES IN MINNESOTA DURING 1972

Selected Minnesota highway crash data are presented to determine trends, to point out problem areas, and to establish the dominant characteristics of motor vehicle crashes in Minnesota so that appropriate countermeasures can be implemented. The report is divided into nine parts: a summary of crash facts; pedestrian accidents; motorcycle accidents; train accidents; bicycle accidents; snowmobile accidents; school bus accidents; teen-age driver accidents; and alcohol involvement in accidents. Many comparisons are made with statistics of earlier years.

June 27, 1974

HS-014 231

Minnesota Dept. of Public Safety, St. Paul  
1973 ; 82p  
Availability: Corporate author

HS-014 227

### **MINNESOTA ALCOHOL PROGRAMS FOR HIGHWAY SAFETY, 1972: AN OVERVIEW WITH STATISTICS**

Minnesota's state programs to decrease the incidence of alcohol involvement in crashes, particularly fatal ones, are described. Chapters are provided on the effects of alcohol, drinking driver legislation, policing the drinking driver, and alcohol and fatal crashes in Minnesota. Statistics show that 57.5% of all fatally injured drivers had alcohol in their system, the majority above the .10% blood alcohol concentration which indicates severe impairment. Appendixes discuss Minnesota drinking/driving statutes, intoxicating liquors statutes, rules and regulations, and beverage alcohol consumption, 1965-72.

Minnesota Dept. of Public Safety, St. Paul  
1973 ; 82p  
Update and consolidation of two previously issued reports:  
The Alcohol-Impaired Driver and Highway Crashes (1970) and  
The Drinking Driver and the Drinking Pedestrian During 1971  
(1972).  
Availability: Corporate author

HS-014 228

### **SMOG CHAMBERS REACTIVITIES OF EMISSIONS FROM LEADED AND LEAD-FREE FUELS**

Photochemical specific reactivities of emissions from automobiles using leaded-premium- and regular-grade fuels and prototype lead-free fuels of comparable octane quality are examined. Emissions were photoirradiated in a 100-cu ft environmental (smog) chamber constructed of aluminum and Pyrex glass at three sets of initial hydrocarbon and oxides of nitrogen concentrations. Reactivity was measured and expressed in terms of rate-of-oxides of nitrogen formation and dosages of oxidant, peroxyacetyl nitrate, peroxypropionyl nitrate, and formaldehyde. The results indicate that the evaporative emission samples and the evaporative plus exhaust emissions samples from the lead-free fuels generally have higher reactivities per gram than those from the leaded fuels. For the samples containing only exhaust emissions, the only trend observed was the lower specific reactivity exhibited by the leaded premium fuel exhaust.

by G. P. Sturm, Jr.; B. Dimitriades  
Bureau of Mines, Washington, D.C.  
Rept. No. RI-7803; PB-225 288 ; 1973 ; 18p 17refs  
Based on work done in cooperation with the Environmental  
Protection Agency.  
Availability: NTIS

HS-014 229

### **SIMPLIFIED ANALYSIS OF STEADY-STATE TURNING BEHAVIOUR OF MOTOR VEHICLES. PT. 2: STABILITY OF THE STEADY-STATE TURN**

The stability of the steady-state motion of a vehicle along a straight line or in a curve is examined by considering the

linearized equations governing the original non-linear equations by dividing the variables into a constant part corresponding to the respective steady-state values and a variable part which assumes small deviations from the steady-state motion. Stability of the motion with respect to an inertial frame is considered, and the mathematics for both the simple linear and non-linear models are derived.

by H. B. Pacejka  
Vehicle System Dynamics v2 n9 p173-83 (Dec 1973)  
1973 ; 3refs  
Pt. 1 appeared in Vehicle System Dynamics v2 p161-72 (1973).  
Pt. 3 follows Pt. 2, p185-204. Pt. 1 is HS-014 037; Pt. 3 is HS-014 230.  
Availability: See serial citation

HS-014 230

### **SIMPLIFIED ANALYSIS OF STEADY-STATE TURNING BEHAVIOUR OF MOTOR VEHICLES. PT. 3: MORE ELABORATE SYSTEMS**

Elaborate systems of analysis of motor vehicle steady-state turning behavior are described. The analysis of the behavior of a real motor vehicle is considerably improved by the introduction of a finite height and width of the vehicle and the inclusion of compliance in wheel suspension and steering system. Non-linearities which originate from geometrical variations due to these compliances are neglected. Emphasis is laid on non-linearities which are due to tire and spring properties. The mathematics of the equations is shown.

by H. B. Pacejka  
Vehicle System Dynamics v2 n9 p185-204 (Dec 1973)  
1973 ; 2refs  
Pt. 1 appeared in Vehicle System Dynamics v2 p161-72. Pt. 2 precedes Pt. 3 (p173-83). Pt. 1 is HS-014 037; Pt. 2 is HS-014 229.  
Availability: See serial citation

HS-014 231

### **TWO-VEHICLE COLLISION RECONSTRUCTION: A RATIONAL, COMPUTER-AIDED APPROACH**

Methods are presented for predicting either initial speeds or impact locations for two inelastic vehicles on a collision course. Forty system parameters are distinguished, of which up to 35 can be deduced with varying degrees of accuracy from post-collision data. The remaining parameters are calculated using the conservation laws of linear momentum, angular momentum, and energy. Essential ingredients of this analysis are the plastic impact deformation energies and the friction work along the post impact trajectories. Examples of central impact and computer-aided studies for oblique impact illustrate how vehicle speed predictions vary within the bounds of uncertain accident data.

by J. F. Wilson  
Vehicle System Dynamics v2 n9 p205-23 (Dec 1973)  
1973 ; 5refs  
Sponsored by Research Engineers, Inc. and Duke Univ.  
Availability: See serial citation

HS-014 232

### **THE RANDOM VIBRATION OF A NONUNIFORM CANTILEVER BEAM WITH CONCENTRATED MASS**

The random vibration of a nonuniform cantilever beam with a concentrated mass at its end is studied as a simple model of the suspension spring of a motor vehicle. The spectral response of the displacement of the concentrated mass is obtained when the beam is subjected to the random motion of the support. The conditions for the validity of the single degree approximation are also discussed.

by G. Ahmadi; J. Hashemi  
Vehicle System Dynamics v2 n9 p225-33 (Dec 1973)  
1973 ; 5refs  
Availability: See serial citation

HS-014 233

### **USING ACCIDENT RESEARCH TO EVALUATE PERIODIC MOTOR VEHICLE INSPECTION**

Periodic motor vehicle inspection is one part of a balanced highway safety program. This paper uses federal safety research data to evaluate inspection and place it in perspective. The evaluation and costs of New Jersey's vehicle inspection system are described leading to the conclusions that the basic mission of an inspection system is to eliminate motor vehicle accidents caused by vehicle defects; inspection is only one part of a balanced overall traffic safety program; current accident investigation and reporting systems do not provide all the data necessary for proper evaluation of safety programs; and that a combination of state operated, state appointed and random spot check inspection may be most effective in solving a state's safety and air pollution problems.

by R. W. McMinn  
New Jersey. Div. of Motor Vehicles, Trenton  
Rept. No. SAE-730706 ; 1973 ; 12p 23refs  
Presented at the SAE West Coast Meeting, Portland, 20-23 Aug 1973.  
Availability: SAE

HS-014 234

### **LESS NOISE FROM DIESEL TRUCKS**

An indepth study to reduce noise produced by a typical highway diesel truck, conducted to determine levels and costs attainable by practical means, is discussed. Truck noise reduction involves isolating several individual noise sources, such as fan, exhaust, engine-radiated, intake system, and others, and developing means to reduce them. Tire noise and major engine revisions are not considered. Goals of 78dB(A) without engine enclosure and 75 dB(A) with engine enclosure are believed possible on the vehicle configuration being studied. This project is sponsored by the U.S. Dept. of Transportation Office of Noise Abatement, and industry.

by R. L. Staadt  
International Harvester Co., Chicago, Ill.  
Rept. No. SAE-730712 ; 1973 ; 6p  
Presented at the SAE West Coast Meeting, Portland, 20-23 Aug 1973.  
Availability: SAE

HS-014 235

### **THE DESIGN OF A COST-EFFECTIVE QUIET DIESEL TRUCK**

The results of a project are reported whose aim was to develop a quiet truck in a cost-effective manner. A method of approach to identification of noise sources and diesel truck noise control is presented, along with a demonstration of noise control techniques and the results obtained. The final drive-by noise level, as measured by SAE J366a procedures, was 73 dB(A). The approach was to take a standard production truck and modify its exhaust system, fan, transmission, and cab enclosure. Although no modifications were made to the engine, a quieting kit consisting of dampening panels was fitted to it.

by D. Averill; W. N. Patterson  
Freightliner Corp., Portland, Oreg.; Bolt, Beranek and Newman  
Rept. No. SAE-730714 ; 1973 ; 22p 5refs  
Presented at the SAE West Coast Meeting, Portland, 20-23 Aug 1973.  
Availability: SAE

HS-014 236

### **MEASUREMENT AND EVALUATION OF EMISSIONS FROM A VARIETY OF CONTROLLED AND UNCONTROLLED LIGHT-DUTY VEHICLES**

Emission data from 19 vehicles, taken with the intent of viewing both emissions and control device deterioration with vehicle age, are presented. Insight is given to the value of the 2500 rpm no-load test for emissions. It was found that the 2500 rpm, no load, is not sufficient load and/or engine speed to cause the throttle to open in all cases. The most obvious effective emission control devices observed were those creating a lean air-fuel ratio, retarded spark at idle, and dashpots on the carburetor to stop rapid closing of the throttle on deceleration. These are described in detail.

by C. J. Anderson; R. B. Berry; M. E. Gunderson; K. L. Tuttle  
Oregon State Univ., Corvallis  
Rept. No. SAE-730715 ; 1973 ; 8p 12refs  
Presented at the SAE West Coast Meeting, Portland, 20-23 Aug 1973.  
Availability: SAE

HS-014 237

### **MODIFYING A 1971 TOYOTA ENGINE FOR THE 1973 REDUCED EMISSION DEVICES RALLY**

The Oregon Institute of Technology's entry in the 1973 Reduced Emission Devices Rally held in California, one which won first prize for class 2 vehicles, is described. The vehicle was a 1961 Anglia with a redesigned 1971 Toyota internal combustion engine. The engine was converted to use liquefied petroleum gas. The wiring was changed from d-c to a-c

June 27, 1974

HS-014 242

because it offered longer spark duration and a turbocharger was added to the LPG fuel system. The modifications resulted particularly in lower carbon monoxide emissions. Details of the vehicle are described.

by G. Klinger  
Oregon Inst. of Tech., Klamath Falls  
Rept. No. SAE-730716 ; 1973 ; 5p  
Presented at the SAE West Coast Meeting, Portland, 20-23 Aug 1973.  
Availability: SAE

HS-014 238

**THE UNIVERSITY OF BRITISH COLUMBIA'S  
URBAN VEHICLE**

The Grand Award winner, designed by the University of British Columbia, of the 1972 Urban Vehicle Design Competition is described. The vehicle components and design features which led to the design of a well-integrated urban vehicle are discussed. Details of the engine, chassis, body, electronics, and overall coordination of the project are outlined. The vehicle was built by the students themselves, starting with a Fiat 128 engine and drive-train and natural gas fuel.

by D. Stasuk; D. O'Connor  
British Columbia Univ., Vancouver (Canada)  
Rept. No. SAE-730717 ; 1973 ; 6p  
Presented at SAE West Coast Meeting, Portland, Oreg., 20-23 Aug 1973.  
Availability: SAE

HS-014 239

**SUPPRESSION OF VEHICLE SPLASH AND SPRAY**

Higher average motor vehicle speeds, combined with wider and flatter highway pavements, have increased visibility problems for following and passing vehicles travelling on wet or snowy highways. Trucks, because of their size, configurations, and the diameter of their wheels, generally create a larger and denser splash and spray pattern than do most automobiles. Reduced speeds for all motor vehicles on wet or snow covered highways offer an immediate solution to the problem. However, most research and testing has concentrated on mechanical devices which can be attached to the vehicle. Some of these devices suppress splash and spray but are not practical due to adverse effects created in other important safety or operational areas.

by T. D. Sherard  
Western Hwy. Inst., San Francisco, Calif.  
Rept. No. SAE-730718 ; 1973 ; 10p 10refs  
Presented at SAE West Coast Meeting, Portland, Oreg., 20-23 Aug 1973.  
Availability: SAE

HS-014 240

**INTRODUCTION TO CATERPILLAR 3400 SERIES  
ENGINES**

With the objective of more completely serving the needs of the trucking industry, a new family of heavy-duty truck engines is being developed to cover the range of 270-750hp. Design parameters were formulated to a large extent from a corporate perception of what is possible and practical in the

development of diesel engines, from marketing projections of horsepower and operational expectation trends, and from discussions with truck manufacturers for their perception of future requirements. Program objectives were established to assure meeting those requirements. The installation of the 3406 engines, which are in limited production, is shown in various truck models.

by D. W. Knopf  
Caterpillar Tractor Co., Peoria, Ill.  
Rept. No. SAE-730720 ; 1973 ; 8p  
Presented at SAE West Coast Meeting, Portland, Oreg., 20-23 Aug 1973.  
Availability: SAE

HS-014 241

**PERFORMANCE AND OPERATIONAL  
CHARACTERISTICS OF HIGH-POWERED DIESEL  
TRUCK ENGINES**

The effect of high power on engine-related operating variables that occur under different highway conditions and dissimilar terrain features is analyzed. It is shown that when properly applied, high-powered diesel engines can increase average vehicle speed and/or fuel economy. In general, high power levels give a relatively free increase in performance on mountain pass operation and expensive, marginal increases in performance on hills and curves. Increased power levels in conjunction with speed control gearing give significant improvements in driveability at the expense of high average engine speeds and poor fuel economy/average vehicle speed tradeoffs.

by J. J. Farrar; D. B. Stattenfield  
Cummins Engine Co., Inc., Columbus, Ohio  
Rept. No. SAE-730721 ; 1973 ; 19p  
Presented at SAE West Coast Meeting, Portland, Oreg., 20-23 Aug 1973.  
Availability: SAE

HS-014 242

**TRANSBUS: A REQUIREMENT FOR URBAN  
TRANSPORTATION**

A new urban transit bus design has been developed that demonstrates the latest technological advancements in automotive engineering. The three prototypes include many innovative designs for passenger comfort, safety, and aesthetic appeal, among which is a low floor height of 17 ins, a special entry ramp for the aged and handicapped, independent suspension for better ride and handling, and improved acceleration, performance, braking, and exhaust emission standards.

by K. R. Barnes; J. W. Wetzel  
Rohr Industries, Inc., Chula Vista, Calif.  
Rept. No. SAE-730725 ; 1973 ; 6p 9refs  
Presented at SAE West Coast Meeting, Portland, Oreg., 20-23  
Aug 1973.  
Availability: SAE

HS-014 243

### **THE UNITED STATES PASSENGER CAR POPULATION THROUGH 1985**

Current and proposed changes in automotive and related areas make an understanding of the future composition of the domestic passenger car population increasingly important. A projected profile of the passenger car population by model year is presented. Supplemental data are provided and discussed. A consideration of the validity of the results and the techniques employed in the study is included.

by C. S. Moore  
Ethyl Corp., Detroit, Mich.  
Rept. No. SAE-730736 ; 1973 ; 18p  
Presented at SAE West Coast Meeting, Portland, Oreg., 20-23  
Aug 1973.  
Availability: SAE

HS-014 244

### **ELECTRON BEAM WELDING OF HEAVY-DUTY TRANSMISSION COMPONENTS**

The conversion from submerged arc welding to electron beam welding (EBW) of transmission components is described. The latter system permits the consistent holding of close tolerances and the obtaining of controllable and repeatable metallurgical structures. In addition, control of the weld and distortions is increased, and weld joints are made feasible in otherwise inaccessible locations. A brief history is presented which touches on the selection of transmission products for EBW, choice of EBW equipment, preliminary evaluation, and acceptance of the process by personnel. The application of EBW to production parts is discussed.

by H. S. Blair; J. A. Hildebrandt  
Clark Equipment Co., Buchanan, Mich.  
Rept. No. SAE-730799 ; 1973 ; 8p  
Presented at National Combined Farm, Construction and Industrial Machinery and Fuels and Lubricants Meetings, Milwaukee, 10-13 Sep 1973.  
Availability: SAE

HS-014 245

### **1971-1972 ACCIDENTS OF CLASS 1 MOTOR CARRIERS OF PASSENGERS**

Tables of statistics are presented which relate to accidents of Class I passenger carriers (motor carriers of passengers having annual operating revenues of \$1,000,000 or more), based on accident reports filed by carriers involved in accidents resulting in death, injury, or \$250 or more property damage. Tables relate to fatalities, injuries, property damage, regional variations, and type of accident for 1971 and 1972. The data seem to indicate a meaningful trend toward greater safety of operation in this sector of the passenger carrier industry.

Bureau of Motor Carrier Safety, Washington, D.C.  
1973 ; 23p  
Availability: Corporate author

HS-800 838

### **SURVEY OF SUSPENSION SYSTEMS ON PICKUP TRUCKS USED TO CARRY SLIDE-IN CAMPERS. VOL. 3. 0DODGE PICKUP TRUCKS0. FINAL REPORT**

A sample of 68 Dodge pickup trucks carrying slide-in campers was surveyed for loading patterns, load capacities, and consumer knowledge in these areas. Trucks were surveyed as they arrived at national parks in their operating condition. Tasks performed in this study were: measurement of load and tire inflation; determination of suspension component capacities from data furnished by manufacturer and Tire and Rim Assoc.; assessment of differences between field measured load data and supplied capacity data; and review of load capacity information available to owners. Results of these studies were: suspension system capacities were exceeded in 47% of the front and 72% of the rear systems surveyed; the weakest suspension component was axles in 75% of the front systems, tires in 44% of the rear systems, and springs in 12% of the rear systems; 63% of the rear tires had inflation pressures under the maximum design value; calculated gross vehicle weight in 75% of the trucks was less than manufacturers gross vehicle weight rating; manufacturer's plate information on axle and spring ratings was confusing and tire and wheel capacities and weakest suspension component capacity were not shown; and owners' manuals do include instruction on weight considerations (since 1968) and tire inflation.

by N. Ludtke  
Pioneer Engineering and Mfg. Co., Inc., Warren, Mich.  
Contract DOT-HS-098-1-136  
1973 ; 168p  
Rept. for May 1971-Mar 1972.  
Availability: NTIS

HS-800 839

### **SURVEY OF SUSPENSION SYSTEMS ON PICKUP TRUCKS USED TO CARRY SLIDE-IN CAMPERS. VOL. 2. 0CHEVROLET PICKUP TRUCKS0. FINAL REPORT**

A sample of 329 Chevrolet pickup trucks carrying slide-in campers was surveyed for loading patterns, load capacities, and consumer knowledge in these areas. Trucks were surveyed as they arrived at national parks in their operating condition. Data sources used for this study were: vehicle weight and tire inflation measurement; suspension system capacity ratings from manufacturer and Tire and Rim Assoc. manuals; and general information from owners' manuals. Results of these studies were: suspension system capacities were exceeded in 46% of the front and 60% of the rear systems surveyed; the weakest suspension component was springs in 74% of the front, 14% of the rear systems, and tires in 56% of the rear systems; 68% of rear tires had inflation pressures under their maximum design value; calculated gross vehicle weight in 44% of the trucks was less than gross vehicle weight rating on the manufacturer's plates; and owners' manuals discussed weight considerations beginning in 1970 and proper tire inflation every year except 1964 and 1965.



by N. Ludtke  
Pioneer Engineering and Mfg. Co., Inc., Warren, Mich.  
Contract DOT-HS-098-1-136  
1973 ; 239p  
Rept. for May 1971-Mar 1972.  
Availability: NTIS

HS-800 843

**SURVEY OF SUSPENSION SYSTEMS ON PICKUP TRUCKS USED TO CARRY SLIDE-IN CAMPERS. VOL. 1. 0CONCLUSIONS AND SUMMARIES0. FINAL REPORT**

More than 900 pickup trucks carrying slide-in campers were analyzed for loading patterns, load capacities, and consumer knowledge in these areas. Trucks were surveyed as they arrived at national parks in their operating condition. Data sources for this effort were: vehicle weight and tire inflation measurement; suspension system capacity ratings from truck manufacturers' publications and Tire and Rim Assoc. manuals; and safety guidelines furnished to owners. It was concluded that: a majority of the pickup trucks are operated with loads greater than the front and/or rear end suspension system capacities; a majority of the truck owners did not have available to them information on the trucks weakest suspension system components or their capacities and the importance of keeping weight within the suspension system capacities or how to do this; wheel rating data was not available to owners; and two out of three rear tires observed were inflated below the maximum recommended pressures (the average rear tire being underinflated by 9 psi).

by N. Ludtke  
Pioneer Engineering and Mfg. Co., Inc., Warren, Mich.  
Contract DOT-HS-098-1-136  
Rept. No. 326-PEM-71-001-Vol-1 ; 1973 ; 156p  
Rept. for May 1971-Mar 1972.  
Availability: NTIS

HS-800 852

**SURVEY OF SUSPENSION SYSTEMS ON PICKUP TRUCKS USED TO CARRY SLIDE-IN CAMPERS. VOL. 4. 0FORD PICKUP TRUCKS0. FINAL REPORT**

A sample of 452 Ford pickup trucks carrying slide-in campers was surveyed for loading patterns, load capacities, and consumer knowledge in these areas. Trucks were surveyed as they arrived at national parks in their operating condition. Tasks performed in this study were: measurement of load and tire inflation; determination of suspension component capacities from data furnished by manufacturer and Tire and Rim Assoc.; assessment of the differences between field measured load data and supplied capacity data; and review of load capacity information available to owners. Results of these tasks showed: suspension system capacities were exceeded in 64% of the front and 63% of the rear systems surveyed; the weakest suspension component was springs in 86% of the front and 36% of the rear systems, and tires in 30% of the rear systems; 66% of rear tires had inflation pressures under the maximum design value; calculated gross vehicle weight in 39% of the trucks was less than manufacturer's gross vehicle weight rating; front and rear suspension system capacities were not shown on manufacturer's plate; and owners' manuals include instructions on tire inflation but do not on weight considerations.

by N. Ludtke  
Pioneer Engineering and Mfg. Co., Inc., Warren, Mich.  
Contract DOT-HS-098-1-136  
1973 ; 272p  
Rept. for May 1971-Mar 1972.  
Availability: NTIS

HS-800 862

**SURVEY OF SUSPENSION SYSTEMS ON PICKUP TRUCKS USED TO CARRY SLIDE-IN CAMPERS. VOL. 5. GMC PICKUP TRUCKS. FINAL REPORT**

A sample of 58 G.M.C. pickup trucks carrying slide-in campers was surveyed for loading patterns, load capacities, and consumer knowledge in these areas. Trucks were surveyed as they arrived at national parks in their operating condition. Tasks performed in this study were: measurement of load and tire inflation; determination of suspension component capacities from data furnished by manufacturer and Tire and Rim Assoc.; assessment of the differences between field measured load data and supplied capacity data; and review of load capacity information available to owners. Results of these tasks showed: suspension system capacities were exceeded in 53% of the front and 59% of the rear systems surveyed; the weakest suspension component was springs in 81% of the front and 33% of the rear systems, and tires in 50% of the rear systems; 68% of rear tires had inflation pressures under the maximum design value; calculated gross vehicle weight in 39% of the trucks was less than manufacturer's gross vehicle weight rating after 1970, the GVWR for each class of a model series was shown on the manufacturer's plate as well as front and rear axle location capacities; and owners' manuals after 1970 included instruction on weight considerations, and after 1965 on tire inflation pressure.

by N. Ludtke  
Pioneer Engineering and Mfg. Co., Inc., Warren, Mich.  
Contract DOT-HS-098-1-136  
1973 ; 166p  
Rept. for May 1971-Mar 1972.

HS-800 880

**SURVEY OF SUSPENSION SYSTEMS ON PICKUP TRUCKS USED TO CARRY SLIDE-IN CAMPERS. VOL. 6. 0INTERNATIONAL HARVESTER PICKUP TRUCKS0. FINAL REPORT**

A sample of 18 International Harvester Co. pickup trucks carrying slide-in campers was surveyed for loading patterns, load capacities, and consumer knowledge in these areas. Trucks were surveyed as they arrived at national parks in their operating condition. Tasks performed in this study were: measurement of load and tire inflation; determination of suspension component capacities from data furnished by manufacturer and Tire and Rim Assoc.; assessment of differences between field measured load data and supplied capacity data; and review of load capacity information available to owners. Results of these tasks showed: suspension system capacities were exceeded in 66% of the front and 77% of the rear systems surveyed; the weakest suspension component was springs in 44% of the front and 22% of the rear systems, and tires in 44% of the rear systems; 66% of rear tires had inflation pressures under the maximum design value; calculated gross vehicle weight in 77% of the trucks was less than manufacturer's gross vehicle weight rating; front and rear suspen-

sion system capacities were not shown on manufacturer's plate; and owners' manuals included instructions on weight considerations and tire inflation.

by N. Ludtke  
Pioneer Engineering and Mfg. Co., Inc., Warren, Mich.  
Contract DOT-HS-098-1-136  
1973 ; 137p  
Rept. for May 1971-Mar 1972.  
Availability: NTIS

HS-800 925

# **LABORATORY EVALUATION OF ALCOHOL SAFETY INTERLOCK SYSTEMS. VOL. 1. SUMMARY REPORT**

Results of an experimental and analytical evaluation of instruments and techniques designed to prevent an intoxicated driver from operating his automobile are presented. The prototype Alcohol Safety Interlock Systems (ASIS) tested were developed both by private industry and by the DOT Transportation Systems Center and all were drawn from a class of instruments which detect intoxication by measuring changes in the subject's ability to perform a psychomotor task. The summary report describes all of the ASIS evaluation work performed through July 1972 and the results of the evaluation. It is supported by an extensive appendix of detailed technical data.

by C. N. Abernethy, 3rd; E. D. Sussman  
Department of Transp., Cambridge, Mass. Transp. Systems Center  
Rept. No. DOT-TSC-NHTSA-73-3-Vol-1 ; 1974 ; 188p refs  
Final Report for Aug 1971-Oct 1972. Supersedes PB-224 284/0 Apr 1973.  
Availability: NTIS

HS-800 995

# **GUIDELINES FOR PLANNING AND DEVELOPING STATE AND COMMUNITY ALCOHOL SAFETY PROGRAMS**

Guidelines are presented to help public officials analyze the alcohol-involved traffic accident problem in their states and communities and plan effective action to combat it. Methods and techniques recommended are being used in 35 federally-funded Alcohol Safety Action Projects (ASAPs) throughout the country. The comprehensive alcohol countermeasures concept is described along with system deficiencies and recommended countermeasures. Appendices are included on alcohol safety activities fundable with 402 funds; material available from the NHTSA; evaluation measures; guidelines for preparing analytical studies; selective evaluation references; additional alcohol safety program assistance; and NHTSA regional offices and participating agencies.

National Hwy. Traf. Safety Administration, Washington, D.C.  
1973 ; 51p 25refs  
Availability: NHTSA

HS-800 996

# **MODELING, SIMULATION AND VERIFICATION OF IMPACT DYNAMICS--VOL. 1, EXECUTIVE REPORT. FINAL REPORT**

by I. K. McIvor  
Michigan Univ., Ann Arbor  
Contract DOT-HS-031-2-481  
Rept. No. UM-HSRI-BI-73-4-1 ; 1974 ; 61p 21refs  
Rept. for 28 June 1972-25 Aug 1973. For abstract and search terms, see HS-800 997--HS-800 999.  
Availability: NTIS

HS-800 997

# **MODELING, SIMULATION AND VERIFICATION OF IMPACT DYNAMICS--VOL. 2, STATE OF THE ART, COMPUTER SIMULATION OF VEHICLE IMPACT. FINAL REPORT**

A simulation spectrum spanning the needs of NHTSA is defined as a basis for assessment of computer simulation programs studying impact dynamics. It is concluded that lumped mass-generalized spring models using experimental crush data to define component behavior adequately provide capability to assess relative deformation of components and gross rigid body acceleration of passenger compartment in collinear impact. Advanced simulation capability is not currently available. More sophisticated frame models have not been qualified as overall vehicle simulations, but have potential as components or modules in future advanced simulations. Problem areas which must be solved to advance the state-of-the-art are delineated, including basic modeling concepts, joint behavior, and dynamic effects.

by I. K. McIvor; A. S. Wineman; W. H. Yang; B. Bowman  
Michigan Univ., Ann Arbor  
Contract DOT-HS-031-2-481  
Rept. No. UM-HSRI-BI-73-4-2 ; 1974 ; 88p 132refs  
Vol. 1 (summary) is HS-800 996; vol. 3 is HS-800 998; vol 4 is HS-800 999. Rept. for 28 Jun 1972-31 Oct 1973.  
Availability: NTIS

HS-800 998

# **MODELING, SIMULATION AND VERIFICATION OF IMPACT DYNAMICS--VOL. 3, STATE OF THE ART OF IMPACT TESTING. FINAL REPORT**

To determine the state-of-the-art of impact testing as related to mathematical crashworthiness modeling, five points were investigated: the techniques used to obtain test specimens, to physically simulate crash loading, and to retrieve structural crash response data from physical tests; the control of state variables and the retrieval of data from a test; the confidence level of physical simulation techniques as a realistic indication of the crash event. These were investigated by combining similar testing methods, data acquisition procedures, and data analysis procedures, and presenting the state of the art of impact testing in the compact package necessary for developing an overview. Digital and analog filtering equipment and

procedures were used for estimating the confidence level. Recommendations are made for developing a catalog of specification for analytical procedures, developing filter system specifications, updating existing filter specifications to include the effects of phase shift and distortion, and developing analytical techniques for waveform comparison.

by D. H. Robbins  
Michigan Univ., Ann Arbor  
Contract DOT-HS-031-2-481  
Rept. No. UM-HSRI-BI-73-4-3 ; 1974 ; 126p 34refs  
Vol. 1 (summary) is HS-800 996; vol. 2 is HS-800 997; vol. 4 is HS-800 999. Rept. for 28 Jun 1972-27 Jul 1973.  
Availability: NTIS

HS-800 999

### **MODELING, SIMULATION AND VERIFICATION OF IMPACT DYNAMICS--VOL. 4, THREE DIMENSIONAL PLASTIC HINGE FRAME SIMULATION MODULE. FINAL REPORT**

The development of a computer program for modeling three dimensional large plastic deformation response of general frame structures is described. It is designed to serve as a preliminary version of a general component module in the overall simulation of vehicle impact. The analysis is based on the extension of the plastic hinge concept to the three dimensional deformation of beams. Theoretical analysis is covered, along with comparison of theory with basic verification tests, and the qualification study which compares computer results with the results of a crush test of a production vehicle frame. A program user's guide and a complete listing of the current version of the program are included. It was concluded that the development of component modules for advanced simulation is feasible, and recommendations for program improvements are suggested.

by I. K. McIvor; A. S. Wineman; W. J. Anderson; H. C. Wang  
Michigan Univ., Ann Arbor  
Contract DOT-HS-031-2-481  
Rept. No. UM-HSRI-BI-73-4-4 ; 1974 ; 187p  
Vols. 1-3 are HS-800 996--HS-800 998. Rept. for 28 June 1972-25 Aug 1973.  
Availability: NTIS

HS-801 001

### **SURVEY OF SUSPENSION SYSTEMS ON CAMPER TRAILERS. VOL. 10. FINAL REPORT**

A survey of 800 camper trailers was made to determine loading patterns, load capacities, and consumer knowledge in these areas. Trailers were surveyed as they arrived at national parks in their operating condition. Tasks performed were: measurement of individual wheel loads and inflation pressures, and identification measurements of suspension components; recording of manufacturers' identification label data; assessment of owners' knowledge of vehicle load capacities; determination of suspension component capacities from data furnished by manufacturers and Tire and Rim Assoc.; comparison of actual weights with furnished data; and review of load capacity information available to owners. Results showed: 56% of surveyed units with known suspension system capacities had loads exceeding those capacities, 1% of units with known unloaded weights on the axle had a greater delivered weight on the suspension system than its capacity; 28% had a

suspension system payload capacity of 0-400 lbs.; average maximum payload was 636 lbs.; average coupling load was 12% of camper trailer weight; 20% of the units had loads exceeding coupling capacity; weakest suspension system components were tires on 38%, springs on 23%, wheels on 33%, and axles on 5% of the units; manufacturers' labels did not show gross vehicle weight or gross axle weight ratings; owners' manuals did not include instruction on weight considerations; and 85% of all camper trailer tires were flated under the maximum recommended tire pressures.

by N. Ludtke  
Pioneer Engineering and Mfg. Co., Inc., Warren, Mich.  
Contract DOT-HS-098-1-136  
1973 ; 198p  
Rept. for May 1971-Mar 1972.  
Availability: NTIS

HS-801 003

### **SUBCOMPACT VEHICLE TESTS WITH INFLATABLE RESTRAINTS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT**

by J. S. McKibben; B. Barclay; L. E. Carlson  
Agbabian Associates, El Segundo, Calif.  
Contract DOT-HS-066-1-185  
Rept. No. R-7213-3016-Vol-1 ; 1973 ; 47p  
Rept. for Jun 1971-Aug 1973. For abstract and search terms, see HS-801 004--HS-801 007.  
Availability: NTIS

HS-801 004

### **SUBCOMPACT VEHICLE TESTS WITH INFLATABLE RESTRAINTS. VOL. 2. TECHNICAL REPORT. FINAL REPORT**

A test project was conducted to gather information on the performance potential of inflatable occupant restraint systems (IORS) in subcompact sedans in full scale vehicle crash conditions. Twelve barrier impact tests were performed with 1972 Ford Pinto vehicles, two of these tests using lap/shoulder belt restraint systems for dummies and the remaining 10 using two different types of IORS. Data were compared to FMVSS 208 requirements, evaluated for repeatability, and analyzed for occupant injury potential. Electronic data for vehicle and dummy responses, normal (sound-speed) and high-speed movie coverage (under separate cover), and 35mm black-and-white photographs and slides were generated on each test. Conclusions reached include: IORS can perform satisfactorily in impact velocities of 30-35mph; currently available test methodology, equipment, and instrumentation is adequate for standards compliance; and most difficult standards parameters to meet with IORS would be chest acceleration resultant magnitude and femur load magnitude.

by J. S. McKibben; B. Barclay; L. E. Carlson  
Agbabian Associates, El Segundo, Calif.  
Contract DOT-HS-066-1-185  
Rept. No. R-7213-3016-Vol-2 ; 1973 ; 247p  
Rept. for Jun 1971-Aug 1973. Includes Appendices A-C, and E. Summary is HS-801 003; vol. 2, app. D is HS-801 005 through HS-801 007. Movie coverage of the tests is available on loan

HS-801 005

from NHTSA as F-000740--F-000745, F-000737, F-000779--F-000783.

Availability: NTIS

HS-801 005

**SUBCOMPACT VEHICLE TESTS WITH INFLATABLE RESTRAINTS. VOL. 2, APP. D, PT. 1, BASELINE TESTS. FINAL REPORT**

A test project was conducted to assess the performance potential of inflatable occupant restraint systems (IORS) in subcompact sedans with full scale vehicle crash conditions. Twelve barrier impact tests were performed with 1972 Ford Pinto vehicles, two of these tests using lap/shoulder belt restraint systems for dummies and the remaining 10 using two different types of IORS. Graphic displays and tabulations of baseline test results (test nos. one and two) are given.

by J. S. McKibben; B. Barclay; L. E. Carlson  
Agabian Associates, El Segundo, Calif.  
Contract DOT-HS-066-1-185

Rept. No. R-7213-3016-Vol-2-App-D-Pt-1 ; 1973 ; 135p  
Rept. for Jun 1971-Aug 1973. Vol. 1 (summary) is HS-801 003; vol. 2 is HS-801 004; vol. 2, app. D, pts. 2 and 3 are HS-801 006 and HS-801 007. Movie coverage of the tests in pt. 1 are available on loan from NHTSA as F-000740 and F-000741.  
Availability: NTIS

HS-801 006

**SUBCOMPACT VEHICLE TESTS WITH INFLATABLE RESTRAINTS. VOL. 2, APP. D, PT. 2, OLIN SYSTEM TESTS. FINAL REPORT**

A test project was conducted to gather information on the performance potential of inflatable occupant restraint systems (IORS) in subcompact sedans with full scale vehicle crash conditions. Twelve barrier impact tests were performed with 1972 Ford Pinto vehicles, two of these tests using lap/shoulder belt restraint systems for dummies and the remaining ten using two different types of IORS. Graphic displays and tabulations of the Olin system test results (tests no. three, five, seven, nine, and eleven) are given.

by J. S. McKibben; B. Barclay; L. E. Carlson  
Agabian Associates, El Segundo, Calif.  
Contract DOT-HS-066-1-185

Rept. No. R-7213-3016-Vol-2-App-D-Pt-2 ; 1974 ; 439p  
Rept. for Jul 1971-Aug 1973. Vol. 1 (summary) is HS-801 003; vol. 2 is HS-801 004; vol. 2, app. D, pts. 1 and 3 are HS-801 005 and HS-801 007. Movie coverage of the tests inpt. 2 are available on loan from NHTSA as F-000742, F-000744, F-000737, F-000780, and F-000782.  
Availability: NTIS

HS-801 007

**SUBCOMPACT VEHICLE TESTS WITH INFLATABLE RESTRAINTS. VOL. 2, APP. D, PT. 3. ROCKET RESEARCH SYSTEM TESTS. FINAL REPORT**

A test project was conducted to gather information on the performance potential of inflatable occupant restraint systems (IORS) in subcompact sedans in full scale vehicle crash conditions. Twelve barrier impact tests were performed with 1972

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Ford Pinto vehicles, two of these tests using lap/shoulder belt restraint systems for dummies and the remaining 10 using two different types of IORS. Graphic displays and tabulations of the Rocket Research system test results (tests no. four, six, eight, ten, and twelve) are given.

by J. S. McKibben; B. Barclay; L. E. Carlson  
Agabian Associates, El Segundo, Calif.

Contract DOT-HS-066-1-185  
Rept. No. R-7213-3016-Vol-2-App-D-Pt-3 ; 1974 ; 460p  
Rept. for Jun 1971-Aug 1974. Vol. 1 (summary) is HS-801 003; VOL. 2 is HS-801 004; vol. 2, app. D, pts. 1 and 2 are HS-801 005 and HS-801 006. Movie coverage of the tests in pt. 3 are available on loan from NHTSA as F-000743, F-000745, F-000779, F-000781, and F-000783.  
Availability: NTIS

HS-801 016

**THE INCIDENCE OF DRUGS IN FATALLY INJURED DRIVERS. FINAL REPORT**

Methods for the collection of blood, urine, bile, and alcohol washes of face and fingers from fatally injured drivers have been developed. A total of 710 specimens supplied by coroners and medical examiners were studied for 44 commonly used drugs. Study methods include fluid extraction, chromatographic screening, gas chromatography, mass spectrometry, alcohol wash, and blood assays. Analytical results indicated that 58% of the drivers had ingested alcohol, and 47% were legally drunk, with 13% evidencing the presence of a prescription drug. Over 5% showed the presence of a prescription drug in the absence of alcohol. The predominant type of prescription drug found was sedative and hypnotic, with over 8% of the fatalities evidencing this type. The test for contact with marijuana yielded 38% positive responses.

by E. J. Woodhouse  
Midwest Inst., Kansas City, Mo.  
Contract DOT-HS-119-1-627  
1974 ; 139p

Rept. for 18 Jun 1971-19 Sept 1973. See also HS-800 753.  
Availability: NTIS

HS-801 026

**SUMMARY OF FORD EXPERIMENTAL SAFETY VEHICLE TESTS. FINAL REPORT**

Testing results of two Ford Experimental Safety Vehicles (ESV's) are reported. Quantitative nondestructive and crash tests were conducted on the ESV's to determine their compliance with the Government performance specifications. This program, which also included the testing and evaluation of Experimental Safety Vehicles manufactured by General Motors Corp., is a continuation of NHTSA's evaluation of ESV's. The overall evaluation of the Ford ESV's is divided into four tasks: design requirements, accident avoidance, crash injury reduction, and postcrash factors evaluations.

Dynamic Science, Phoenix, Ariz.  
Contract DOT-HS-046-2-468  
Rept. No. 2310-73-119 ; 1974 ; 32p  
Report for Jan-Jun 1973.  
Availability: NTIS

HS-801 027

**CRASH INJURY REDUCTION AND POST-CRASH FACTORS EVALUATIONS. AMF ESV AND FORD ESV. SIXTY-MPH FRONT-TO-REAR IMPACT. FINAL REPORT**

The results of a 60-mph front-to-rear crash test of an AMF experimental safety vehicle (ESV) into the rear of a stationary Ford EVS are presented. The overall purpose of the research program is to perform quantitative nondestructive and crash tests on ESV's manufactured by General Motors Corp. and Ford Motor Co. Primary objectives of the test reported were to determine the occupant and structural responses of the struck vehicle and to acquire limited data on the responses of the striking vehicle.

Dynamic Science, Phoenix, Ariz.  
Contract DOT-HS-046-2-468  
Rept. No. 2310-73-118 ; 1974 ; 71p  
Report for Jun-Jul 1973.  
Availability: NTIS

HS-801 035

**PROCEEDINGS: INTERNATIONAL ACCIDENT INVESTIGATION WORKSHOP, BRUSSELS, BELGIUM, JUNE 28-29, 1973. PILOT STUDY ON ROAD SAFETY**

Papers presented at a NATO workshop on investigative methodology related to vehicle deformation, impact speed determinations, injury severity scaling, and road safety pilot project results are given. A shortened Collision Analysis Report form is described. The continuation of an international accident investigation program is advocated. Topics covered include: intervention methodology, vehicular deformation study; methodology for coding accident configuration; safety belts; benefits and possibilities of accident studies; pre-crash, tri-level methodology for collision data generation; summary of experiences in reducing data from an international collision analysis report form; injury assessment; use of the vehicle deformation index and collision speed assessments; computer impact simulation; illustration and classification of injury data; and occupant injury classification procedures using the Abbreviated Injury Scale.

by E. E. Flamboe, ed.; S. N. Lee, ed.  
National Hwy. Traf. Safety Administration, Washington, D.C.  
1973 ; 176p refs  
Prepared for the Committee on the Challenges of Modern Society, NATO. Text of one paper is in French. Some abstracts in French.  
Availability: NHTSA

HS-801 036

**DEVELOPMENT AND EVALUATION OF ANTICIPATORY CRASH SENSORS FOR AUTOMOBILES. FINAL REPORT**

The preferred means, potential effectiveness, and estimated costs of carrying out anticipatory sensing of automobile collisions are delineated. Actuation of passive restraint systems requires only a small advance warning to extend the protection of such safety devices to impact speeds of 30 to 60 MPH, a range encompassing a large number of fatal and severe-injury accidents. Radar is seen as the most promising crash sensing technique. Design, construction, and extensive test of prototype systems show that a price of \$20 per unit should be attainable for systems exhibiting extremely high electronic reliability. Such sensors, however, are likely to detect only 60-80% of the major collision objects encountered. A very low rate of inadvertent actuations is possible, occurring only in the course of certain minor, yet high-speed, collisions. Potential benefits of full implementation are estimated to exceed prevention of 5000 deaths and 200,000 injuries annually. However, ultimate viability of anticipatory sensing systems will depend upon the use and effectiveness of improved vehicle structures and passive restraint systems.

by J. Hopkins; F. R. Holmstrom; M. Hazel; R. Abbott  
Department of Transp., Cambridge, Mass. Transp. Systems Center  
Rept. No. DOT-TSC-NHTSA-73-6 ; 1974 ; 304p refs  
Report for Jun 1970-Jun 1973.  
Availability: NTIS

HS-801 037

**EXHAUST-SYSTEM LEAK TEST: QUANTITATIVE PROCEDURE. FINAL REPORT**

A quantitative, periodic motor vehicle safety-inspection test for determining the leakage rate of engine exhaust from an automotive exhaust system was investigated. Results of the measurement are expressed as the diameter of a single round hole, equivalent in leakage rate to the sum of all leaks in the exhaust system being tested. This method is capable of measuring leaks equivalent in size down to about a 1/16-in hole. Total time to conduct a test and evaluate results is 2-5 mins. The test imposes a reproducible pressure stress on each system tested, providing reasonable assurance that the system will remain structurally intact until the next inspection period without developing catastrophic leakage. A field test kit can accommodate engine displacements to 460 cubic ins. Flow calibration data are given along with a detailed test procedure.

by E. C. Klaubert  
 Department of Transp., Cambridge, Mass. Transp. Systems  
 Center  
 Rept. No. DOT-TSC-NHTSA-72-10 ; 1974 ; 110p refs  
 Report for Jul 1970-Jun 1972.  
 Availability: NTIS

HS-801 039

# **INVESTIGATION OF NEW CONCEPTS OF AIR BAG RESTRAINT SYSTEMS FOR FRONT SEAT PASSENGERS. FINAL REPORT**

An advanced inflatable restraint system for right front seat occupant protection during frontal and oblique frontal collisions at impact velocities up to 50 mph is described. Research results are summarized for two concepts: the multicell and the air bag/collapsible panel combination. The multicell air bag concept is shown to provide inadequate protection at speeds above 35 mph due to low stroke efficiency. Tests led to design of a smaller air bag in series with a collapsible panel. The stroke efficiency was improved by providing earlier buildup of restraint forces and a more constant force level. Performance was generally satisfactory for a 95th percentile male in a 45 mph frontal impact; better protection was achieved for a 50-lb child and a 50th percentile male at speeds of 40 and 50 mph, respectively.

by D. J. Biss; N. E. Shoemaker  
 Calspan Corp., Buffalo, N. Y.  
 Contract DOT-HS-053-2-280  
 Rept. No. ZM-5115-V-1 ; 1973 ; 205p 10refs  
 Rept. for Feb 1972-Oct 1973.  
 Availability: NTIS

HS-801 048

# **ANALYSIS OF WASHTENAW COUNTY ALCOHOL SAFETY ACTION PROGRAM POLICE COUNTERMEASURE ACTIVITY. FINAL REPORT**

Three Washtenaw County police departments' special alcohol patrols created to assist in the identification and apprehension of drunk drivers, a countermeasure of the Washtenaw County Alcohol Safety Action Program, are described. Arrest patterns and activities of the patrols are discussed. During 1971 and 1972, county arrests increased 75% over the previous two years. However, during the first five months of 1973, the frequency of arrests declined to a level similar to the comparable time period in 1971, atypical of the rest of the state. The increase in 1971 arrests are ASAP-related; subsequent increases were due to a 208% increase in the number of young people (16-20) arrested, coinciding with a reduction in Michigan's legal drinking age. The number of persons arrested, aged 21 years and older, increased slightly in 1972, but both proportional and absolute decreases in the number arrested with blood alcohol concentrations of 0.20 and higher occurred, in accordance with program goals.

by C. D. Clark  
 Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
 Contract FH-11-7535  
 Rept. No. UM-HSRI-AL-73-13 ; 1973 ; 40p  
 Sponsored by the Washtenaw County Alcohol Safety Action Program, Washtenaw County Health Dept., Ann Arbor, Mich.  
 Availability: Corporate author

HS-801 049

# **ANALYSIS OF WASHTENAW COUNTY ALCOHOL SAFETY ACTION PROGRAM JUDICIAL, REFERRAL AND DIAGNOSTIC ACTIVITY. FINAL REPORT**

Judges in the two Washtenaw County District Courts participated in the Washtenaw County Alcohol Safety Action Program by referring persons convicted of alcohol-related offenses to counselors for diagnosis of possible drinking problems. The results of the disposition and sentencing processes, use of the referral system by the courts, and the drinking diagnoses resulting from referrals are discussed. Defendants arrested for driving under the influence of liquor were more likely to receive reductions to the lesser included offense of impaired driving than in pre-program years; only 6% were not convicted. Three quarters of alcohol-related traffic offenders and over 33% of drunk and disorderly offenders were referred to alcoholism counselors; 61% were diagnosed as alcoholics or problem drinkers, 10% were pre-alcoholic, and 29% did not exhibit problem drinking.

by C. D. Clark  
 Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
 Contract FH-11-7535  
 Rept. No. UM-HSRI-AL-73-14 ; 1973 ; 40p  
 Sponsored by the Washtenaw County Alcohol Safety Action Program, Washtenaw County Health Dept., Ann Arbor, Mich.  
 Availability: Corporate author

HS-801 050

# **ANALYSIS OF WASHTENAW COUNTY ALCOHOL SAFETY ACTION PROGRAM TREATMENT COUNTERMEASURES. FINAL REPORT**

Alcohol-related recidivism served as the primary measure for evaluating Washtenaw County Alcohol Safety Action Program treatment activities. Alcohol-related convictions and crashes were compared between all persons convicted of drunk driving during the program (1971-72) and a similar population convicted during 1969-70. Results indicate that although recidivism rates measured by convictions were lower for the program population than for the comparison population, the differences were not statistically significant. However, the alcohol-related crash experience was significantly better for the program population than for the comparison group. Results also suggest that if more individuals had been referred to ASAP or if more had been placed in treatment programs other than legal sanctions only, the recidivism rates would have improved more than they did.

June 27, 1974

HS-801 057

by C. D. Clark; F. A. Clark  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Contract FH-11-7535  
Rept. No. UM-HSRI-AL-73-15 ; 1973 ; 34p  
Sponsored by the Washtenaw County Alcohol Safety Action  
Program, Washtenaw County Health Dept., Ann Arbor, Mich.  
Availability: Corporate author

HS-801 051

### **ANALYSIS OF WASHTENAW COUNTY ALCOHOL SAFETY ACTION PROGRAM CRASH CRITERIA MEASURES. FINAL REPORT**

The Washtenaw County Alcohol Safety Action Program (ASAP) effectiveness in reducing the number of alcohol-related crashes and their consequences are discussed, including several countermeasure activities directed toward those elements thought to contribute to the occurrence of alcohol-related crashes. Favorable changes regarding the program objectives are not indicated. Crashes have continued to increase yearly, with county crashes showing trends similar to those of the state. No decreases in the proportion of alcohol-related crashes were identified. Reported alcohol-involvement increased among fatal crashes, although this was possible due to improvement in the blood alcohol testing rates for fatalities. The proportion of alcohol-related non-fatal crashes remained constant. The only result consistent with ASAP objectives was a slight decrease in the proportion of county drinking drivers involved in non-fatal crashes.

by C. D. Clark; F. A. Clark  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Contract FH-11-7535  
Rept. No. UM-HSRI-AL-73-16 ;

Sponsored by the Washtenaw County Alcohol Safety Action  
Program, Washtenaw County Health Dept., Ann Arbor, Mich.  
Availability: Corporate author

HS-801 054

### **HANDBOOK FOR THE ALCOHOL COUNTERMEASURES PROGRAM**

An alcohol countermeasures program handbook is presented for use by women's national organizations at national, regional, state, and local levels in promoting understanding and support of the DOT Traffic Safety Alcohol Countermeasures Program. Following an overview of the problems, including governmental and women's roles, the program itself is assessed with regard to major elements, objectives, public information, and research and development. Mission Countermeasure and alcohol countermeasures are discussed, including enforcement and license control, education, chemical tests, medical aspects, laws, driver records, pedestrian assistance, Alcohol Safety Action Programs, national, state and community resources. Member organizations are also given.

National Hwy. Traf. Safety Administration, Washington, D.C.  
1973 ; 46p  
Availability: NHTSA

HS-801 055

### **BRAKES: A COMPARISON OF BRAKING PERFORMANCE FOR 1974 PASSENGER CARS AND MOTORCYCLES**

The stopping distance reported by individual automobile and motorcycle manufacturers from 60 mph with fully operational brakes under the most adverse load condition is presented. Stopping distances are listed in descending order of performance, and the total range of performance of all makes and models is contained within a chart. The data were compiled by NHTSA from information provided by the individual motor vehicle manufacturers in response to DOT regulations.

National Hwy. Traf. Safety Administration, Washington, D.C.  
Consumer Aid Series v4 pt1 (Nov 1973)  
1973 ; 40p  
Availability: GPO

HS-801 056

### **TIRES--A COMPARISON OF TIRE RESERVE LOAD FOR 1974 PASSENGER CARS**

The lowest tire reserve load reported by individual automobile manufacturers of all tires recommended for installation on specific vehicles is presented in table form. The loads are listed in descending order of performance, and the total range of performance on all makes and models is contained within a chart. The information is compiled by NHTSA from data provided by the individual motor vehicle manufacturers in response to DOT regulations.

National Hwy. Traf. Safety Administration, Washington, D.C.  
Consumer Aid Series v4 n2 (Nov 1973)  
1973 ; 54p  
Availability: GPO

HS-801 057

### **ACCELERATION AND PASSING ABILITY--A COMPARISON OF ACCELERATION AND PASSING ABILITY FOR 1974 PASSENGER CARS AND MOTORCYCLES**

The acceleration and passing ability reported by individual automobile and motorcycle manufacturers is described, with figures listed in descending order of performance (elapsed time). The total range of performance of all makes and models is contained within each chart. The information is compiled by NHTSA from data provided by the individual motor vehicle manufacturers in response to DOT regulations, which require the manufacturer to submit the time in seconds and the distance in feet required to pass a 55-foot long truck in a low-speed pass (20-35 mph) and in a high-speed pass (50-80 mph) situation. This booklet presents the high-speed pass ability only, with the figures assuming that the truck and the passing vehicle, in separate lanes, are initially traveling at 50 mph with the passing vehicle 100 feet behind.

HS-801 063

HSI 748

National Hwy. Traf. Safety Administration, Washington, D.C.  
Consumer Aid Series v1 n3 (Nov 1973)  
1973 ; 61p  
Availability: GPO

HS-801 063

**THE 1970-71 WASHTENAW COUNTY HIGH SCHOOL SURVEY ON DRINKING AND DRIVING. SUMMARY REPORT**

The results of a questionnaire completed by 436 senior high school students in Washtenaw County during the 1970-71 school year, in order to obtain baseline data helpful for evaluation of the public information program being carried out by the Washtenaw County Alcohol Safety Action Program, are presented. The survey studied driving experience, driving record, driver education, exposure to drinking and driving information, radio listenership and newspaper readership, drinking and driving after drinking experience, role of alcohol in traffic accidents and driving ability, legal aspects, and respondent demographic and background information. It was found that 66% of the students reported drinking at least occasionally, 15% once a week or more; 54% had driver's licenses and 13% learner's permits; 22% drove after drinking two or more drinks in the previous three months.

by A. C. Wolfe; M. M. Chapman  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Contract FH-11-7535  
Rept. No. UM-HSRI-AL-72-3; PB-220 789 ; 1972 ; 37p  
Sponsored by the Washtenaw County Alcohol Safety Action Program, Washtenaw County Health Dept., Ann Arbor, Mich.  
Availability: NTIS

HS-801 064

**THE 1971 SURVEY OF WASHTENAW COUNTY PHYSICIANS CONCERNING ALCOHOLISM AND TRAFFIC SAFETY. SUMMARY REPORT AND CODEBOOK WITH MARGINALS**

The results of a questionnaire filled out by 187 physicians in 1971-72, distributed to obtain baseline information for evaluating the public information program for physicians of the Washtenaw County Alcohol Safety Action Program, are summarized. Content areas of the survey include the role of alcohol in traffic accidents, number of drinks and accident risk, drunk driving countermeasures, experience with problem drinkers, diagnosis and treatment of problem drinking, general attitudes toward alcohol problems, and training for giving help to problem drinkers. It was found that 75% of the physicians had seen at least one problem drinking patient in the past year, and 11% had seen 100 or more; almost all recognized alcohol abuse as a serious problem, and over half of the treating physicians saw a need for additional treatment facilities; and 91% felt positive toward the use of Antabuse in conjunction with other forms of treatment.

by A. C. Wolfe; M. M. Chapman  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Contract FH-11-7535  
Rept. No. UM-HSRI-AL-72-4; PB-220 790 ; 1972 ; 44p  
Prepared for Washtenaw County Alcohol Safety Action Program, Washtenaw County Health Dept., Ann Arbor, Mich.  
Availability: NTIS

HS-801 065

**WASHTENAW COUNTY LAW ENFORCEMENT OFFICERS, 1971 SURVEY ON ALCOHOL AND TRAFFIC SAFETY. SUMMARY REPORT AND CODEBOOK WITH MARGINALS**

The results of a questionnaire completed by 94 law enforcement officers as part of an evaluation of the public information program for police officers of the Washtenaw County Alcohol Safety Action Program are summarized. Content areas included alcohol and other factors in traffic accidents; alcohol consumption quantities, accident risk, and illegal levels; factors influencing alcohol effects, problems in general, and sources of help; attitudes toward various drunk driving countermeasures; own training and experience in handling drunk driving cases; and own drinking behavior and other personal data. Only 25% reported any special training in the drinking driver problem, and many were poorly informed regarding numbers of safe and legal drinks and factors influencing alcohol effects. Almost all felt that drunk driving charges are reduced too frequently by the courts. The complete survey codebook is included.

by A. C. Wolfe; M. M. Chapman  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Contract FH-11-7535  
Rept. No. UM-HSRI-AL-72-2; PB-220 772 ; 1972 ; 57p  
Sponsored by the Washtenaw County Alcohol Safety Action Program, Washtenaw County Health Dept., Ann Arbor, Mich.  
Availability: NTIS

HS-801 066

**WASHTENAW AND JACKSON COUNTIES 1971 SURVEY ON DRINKING AND DRIVING. SUMMARY REPORT AND CODEBOOK WITH MARGINALS**

Results are summarized of a questionnaire completed by 370 members of 12 Washtenaw County service clubs and 425 members of 13 Jackson County service clubs. Topics include knowledge about the role of alcohol in traffic crashes and the relationship between the consumption of various amounts of alcohol and accident risk; awareness of media messages on drinking and driving; attitudes toward the alcohol problem in general; willingness to support alcohol safety programs; attitudes toward various alcohol safety countermeasures; and own drinking and driving behavior. The survey helped evaluate the Washtenaw Alcohol Safety Action program. Jackson County had no such program and was used as a control. In general the two samples were comparable in their answers, with Jackson respondents slightly more likely to see or hear drinking driving messages and less likely to report driving after drinking. The complete survey codebook showing percentage results on each question is included.



by A. C. Wolfe; M. M. Chapman  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Contract FH-11-7535  
Rept. No. UM-HSRI-AL-72-6; PB-220 791 ; 1972 ; 29p  
Prepared for Washtenaw County Alcohol Safety Action  
Program, Washtenaw County Health Dept., Ann Arbor, Mich.  
Availability: NTIS

HS-801 068

**ASAP EVALUATION PROGRESS SEMINAR,  
SEPTEMBER 11-14, 1973, WASHINGTON, D. C.  
SELECTED PROJECT EVALUATION ANALYTIC  
STUDIES**

A selected set of the Special Analytic Studies produced under the Evaluation Program of the NHTSA Alcohol Safety Action Projects (ASAP) is presented. The 11 studies chosen were based on the general interest of the countermeasure activity covered and of the research methodology employed in the analysis. Topics dealt with include: analysis of ultimate performance measures to determine total project impact in Oregon, Washington, and North Carolina; ASAP patrol activity in Columbus, Georgia, and Oklahoma City; analysis of the judicial disposition of alcohol-related traffic arrests; drinking driver diagnosis, referral, and treatment; the Nassau County ASAP driver rehabilitation countermeasure; and an analysis of alcohol safety schools (the Phoenix Driving-While-Intoxicated Course).

National Hwy. Traf. Safety Administration, Washington, D.C.  
1973 ; 490p refs  
Includes HS-801 069--HS-801 079.  
Availability: NHTSA

HS-801 069

**AN ANALYSIS OF ULTIMATE PERFORMANCE  
MEASURES TO DETERMINE TOTAL PROJECT  
IMPACT. ANALYTIC STUDY 1 (OREGON)**

Ultimate performance measures are analyzed to determine total Alcohol Safety Action Project (ASAP) impact in Oregon. Focus is on the change in level or distribution of fatal and injury accidents, and alcohol-related fatal and injury accidents; possible causative factors in their changes; and the cost effectiveness of the program. Data from Portland and Lane County was of primary use in the analysis. There is no indication that there was a change in level associated with the project for fatal or injury accidents for the period 1968-1972. No project associated differences in mean blood alcohol concentration levels of fatally injured drivers were found. There was no significant trend in fatal accidents during high drinking and driving periods, although injury accidents did show some change in Portland, which may be associated with the fact that ASAP emphasis patrols exist. No cost effectiveness was calculated.

by R. S. Vaught; B. H. Bronfman; S. R. Keil  
Oregon Res. Inst., Eugene  
Grant NIH-RR-3  
HS-801 068, ASAP Evaluation Progress Seminar, September  
11-14, 1973, Washington, D. C.  
1973 ; 61p 7refs  
Prepared for the Alcohol and Drug Section, Oregon State  
Division of Mental Health.  
Availability: In HS-801 068

HS-801 070

**AN ANALYSIS OF ULTIMATE PERFORMANCE  
MEASURES TO DETERMINE TOTAL PROJECT  
IMPACT. ANALYTIC STUDY 1 (WASHINGTON)**

Ultimate performance measures are analyzed to determine total impact of the Washington Alcohol Safety Action Project. A significant difference was found in the monthly mean of alcohol-related fatal accidents associated with the ASAP yet no decrease in yearly means (1968-1972) associated with the project was found. No project-related change in level for fatal accidents during high drinking and driving periods was found, and no evidence for change in level for single vehicle or multiple vehicle injury accidents. Roadside surveys showed a consistent downward trend in weighted mean blood alcohol concentration levels (BACs). Mean BACs of arrested drivers were lower for special patrols than for regular patrols. Household surveys found that there was a significant project effect between the surveys, indicating that individual attitudes had changed in a positive direction. It is suggested that the net return per dollar spent on the project is about \$4.70.

by R. S. Vaught; B. H. Bronfman; S. R. Keil  
Oregon Res. Inst., Eugene  
Grant NIH-RR-3  
HS-801 068, ASAP Evaluation Progress Seminar, September  
11-14, 1973, Washington, D. C.  
1973 ; 44p 7refs  
Prepared for the Washington State Dept. of Motor Vehicles.  
Availability: In HS-801 068

HS-801 071

**MECKLENBURG ALCOHOL SAFETY ACTION  
PROJECT. TOTAL PROJECT IMPACT MEASURES.  
ANALYTICAL STUDY**

Ultimate performance measures are analyzed to determine total project impact of the Mecklenburg County Alcohol Safety Action Project (MASAP). Details are presented on the MASAP Information System at the end of the second countermeasure year; an assessment of changes in drinking-driving knowledge, attitudes and practices from 1970 to 1972; and results of a drinking-driving roadside interview survey. There was a statistically significant decrease in the fatality rate and fatal crash rate in the county from 1971 to 1972, while rates in the rest of the state increased. The 1971 Public Information Education campaign seemed to have decreasing effect upon the death and fatal crash rate. Blood alcohol concentration levels decreased, but no statistical significance is drawn. Program cost effectiveness is examined.

11-14, 1973, Washington, D. C.  
1973 ; 27p  
Prepared for Mecklenburg County Alcohol Safety Action  
Program, Charlotte, N. C.  
Availability: In HS-801 068

HS-801 072

### **AN ANALYSIS OF ASAP PATROL ACTIVITY IN COLUMBUS, GEORGIA DURING 1972. ANALYTIC STUDY 3**

Columbus Alcohol Safety Action Project's (ASAPs) use of police patrols is evaluated. Background data are given on the operation of the ASAP enforcement unit, including selection, training, strategy, and arrest procedure. The arrest activities of the unit and its cost effectiveness are examined, along with the impact of ASAP patrol activity on the awareness of risk involved in intoxicated driving and the extent of intoxicated driving. Consequences of ASAP patrol activity are discussed. The catalytic effects likely due to ASAP patrol activity are also considered, including consequences for the general police force and its effect on other ASAP countermeasure activity areas. There was a 153% increase in alcohol-related arrests, but ASAP patrols did not seem to generate a perception of greater risk of being arrested. There was a decrease in blood alcohol concentration levels among drivers who know of ASAP activities, and a 12% decrease in alcohol-related crashes in ASAP areas and time periods.

by C. W. Peek  
Georgia Univ., Athens  
HS-801 068, ASAP Evaluation Progress Seminar, September  
11-14, 1973, Washington, D. C.  
1973 ; 20p  
Availability: In HS-801 068

HS-801 073

### **ASAP PATROL ACTIVITIES. OKLAHOMA CITY ASAP. ANALYTIC STUDY**

Patrol activities of the Oklahoma City Alcohol Safety Action Project are assessed, with focus on the Alcohol Traffic Safety Unit (ATSU), the Mobile Alcohol Laboratory Processing Unit (MALPU), and the Follow-Up Unit. The ATSU operates as the direct enforcement arm of the ASAP, while the MALPU's and Follow-Up Unit support the ATSU operation, as well as the alcohol-related arrest activities of the regular patrol. Patrol strategies are outlined. The effectiveness of the ATSU is noted in that alcohol-related arrests per man-hour have increased even though a significant number of new personnel were added during the year surveyed. The trend toward investigating more non-alcohol-related accidents is noted, as is the continuing difference in mean time per arrest for the ATSU versus regular patrol, and the improvement in win-loss record for both patrols. Cost effectiveness of the program is examined.

1973 ; 25p  
Availability: In HS-801 068

HS-801 074

### **ANALYSIS OF THE JUDICIAL DISPOSITION OF ALCOHOL-RELATED TRAFFIC ARRESTS. (OHIO)**

The judicial disposition of alcohol-related traffic arrests connected with the Cincinnati Alcohol Safety Action Project (ASAP) is discussed. Typical procedures followed in the cases are examined, beginning with arrest, along with an analysis of the disposition of all cases, data regarding the disposition of cases by individual judges, and a summary of problems faced by the court. It is concluded that the court has been supportive of ASAP and has performed well in the face of substantial handicaps. The overall conviction rate is high; the number of outright dismissals, 6.8% of all cases, is low.

by Anonymous  
Cincinnati Univ., Ohio  
HS-801 068, ASAP Evaluation Progress Seminar, September  
11-14, 1973, Washington, D. C.  
1973 ; 36p  
Prepared for the Office of Alcohol Countermeasures, NHTSA,  
and the Alcohol Safety Action Program, Cincinnati.  
Availability: In HS-801 068

HS-801 075

### **AN ANALYSIS OF THE JUDICIAL DISPOSITION OF ALCOHOL-RELATED TRAFFIC ARRESTS. ANNUAL REPORT NO. 1, PT. 4. (MISSOURI)**

Judicial countermeasures of the Kansas City Alcohol Safety Action Project (ASAP) are discussed, including the performance of the special prosecution countermeasures, the disposition of the DWI cases, and the ASAP Court Records Section. Primary attention is given to the special prosecution countermeasure, which is the major Kansas City ASAP judicial countermeasure. Personnel, duties, and performance are outlined, along with dispositions and sentences. Catalytic effects attributable to the prosecution countermeasure are noted. A trend toward plea bargaining is cited as a cause of reduced conviction rates. It is concluded that the Special Appeals Prosecution effort was not justifiable in terms of results, was expensive, with no significant difference in case outcome. The ASAP court records division has provided most of the input and services required.

June 27, 1974

HS-801 079

by G. A. Beitel; W. D. Glauz  
Midwest Res. Inst., Kansas City, Mo.  
Contract DOT-HS-077-1-100  
HS-801 068, ASAP Evaluation Progress Seminar, September  
11-14, 1973, Washington, D. C.  
1973 ; 16p  
Prepared for the Kansas City (Mo.) Alcohol Safety Action  
Project.

HS-801 076

**AN ANALYSIS OF DRINKING DRIVER DIAGNOSIS,  
REFERRAL, AND TREATMENT. ANALYTIC STUDY  
NO. 5**

The structure developed for problem drinker diagnosis, referral, and treatment within the South Dakota Alcohol Safety Action Project (ASAP) is examined. The same personnel involved in the identification of problem drinker drivers and the establishment of treatment recommendations for them are involved in some of the treatment programs. Treatment options, Alcoholics Anonymous, inpatient treatment, outpatient treatment, driver improvement school, and problem drinker driver classes are described and evaluated, with statistical data on classification and procedures included.

by D. L. Struckman  
South Dakota Univ., Vermillion  
Contract DOT-HS-045-1-061  
HS-801 068, ASAP Evaluation Progress Seminar, September  
11-14, 1973, Washington, D. C.  
1973 ; 68p  
Prepared for the South Dakota Alcohol Safety Action Project,  
and the Office of Alcohol Countermeasures, NHTSA.  
Availability: In HS-801 076

HS-801 077

**AN ANALYSIS OF PROBLEM DRINKER DIAGNOSIS  
AND REFERRAL ACTIVITY. ANALYTIC STUDY NO.  
5**

Problem drinker diagnosis and referral activity of the Lincoln, Nebraska, Alcohol Safety Action Project (ASAP) are examined. It is noted that in-depth analysis and definite conclusions cannot be statistically established. Areas considered include: the background investigation process, the referral network, characteristics of the problem drinker-drivers, and the impact of the rehabilitation countermeasure. A complete description of the judicial/rehabilitation system is included in an appendix. A special section is also included on the need for further study which outlines proposed areas of future investigation, including a longitudinal study to evaluate the success of the rehabilitation and re-education countermeasure.

by M. V. Pearson; J. G. Brady  
Lincoln Alcohol Safety Action Proj., Nebr.  
Contract DOT-HS-044-01-060  
HS-801 068, ASAP Evaluation Progress Seminar, September  
11-14, 1973, Washington, D. C.  
1973 ; 110p 16refs  
Prepared for the Office of Alcohol Countermeasures, NHTSA.  
For limited use only. Not to be quoted without permission  
from Lincoln Alcohol Safety Action Project.  
Availability: In HS-801 068

HS-801 078

**ANALYSIS OF THE NASSAU COUNTY ALCOHOL  
SAFETY ACTION PROJECT DRIVER  
REHABILITATION COUNTERMEASURE**

The subsequent driving records (alcohol related conviction, accidents, and other convictions) were compared for 2153 DWI/DWAI offenders invited to attend the Nassau County, New York Alcohol Safety Action Project rehabilitation programs in 1971 and 1972, and 2092 offenders were randomly assigned to a control group. The results show no difference in the DWI/DWAI recidivism rates of the two groups, but more in the invited group had subsequent accidents and non-alcohol related traffic convictions. The DWI/DWAI recidivism rate among program participants was lower than among those invited who declined to attend or those who dropped out; but the proportion of persons in the participant group who had subsequent accidents and other violations was higher than among those who declined or dropped out.

by D. F. Preusser; R. G. Ulmer  
Dunlap and Associates, Inc., Darien, Conn. (HQ)  
Contract FH-11-7547  
HS-801 068, ASAP Evaluation Progress Seminar, September  
11-14, 1973, Washington, D. C.  
1973 ; 28p  
Prepared for NHTSA.  
Availability: In HS-801 068

HS-801 079

**AN ANALYSIS OF ALCOHOL SAFETY SCHOOLS  
(PHOENIX DRIVING-WHILE-INTOXICATED  
COURSE). 1972 ANALYTIC STUDY 6**

The alcohol safety schools in the Phoenix Alcohol Safety Action Project are described, with focus on the Phoenix Driving While Intoxicated Course. Background information is given along with a description of two data collection procedures. The four-class curriculum centered on the drinking driver, alcohol and driving skill, problem drinking, and personal action is examined as well as the one-class curriculum. Attendance data, measures of effort, performance and efficient, statistical analysis of school effectiveness, driver profile for recidivists, and impact of the Phoenix DWI course are evaluated, and a statistical summary of the school program is given.

Arizona State Univ., Tempe  
Contract DOT-HS-052-1-068  
HS-801 068, ASAP Evaluation Progress Seminar, September  
11-14, 1973, Washington, D. C.  
1973 ; 69p 3refs  
Prepared in cooperation with the City of Phoenix Alcohol  
Safety Action Project for the Office of Alcohol  
Countermeasures, NHTSA.  
Availability: In HS-801 068

HS-801 090

### **WASHTENAW COUNTY ATTORNEY, 1971 SURVEY ON DRINKING AND DRIVING. SUMMARY REPORT AND CODEBOOK WITH MARGINALS**

Results are summarized of a self-administered questionnaire completed by 200 attorneys in Washtenaw County as part of the evaluation of the public information program for attorneys carried out by the Washtenaw County Alcohol Safety Action Program. Content areas included the role of alcohol in traffic accidents; alcohol consumption quantities and accident risk; attitudes toward implied consent laws and other types of drunk driving countermeasures; the alcohol problem in general and sources of alcohol help; and own experience in handling drunk driving cases and their disposition, including suggestions for improvement. A majority of the respondents approved of the implied consent laws and of the proposed lowering of the presumptive illegal blood alcohol concentration level, and most also supported the use of Antabuse as a condition of probation for convicted problem drinkers. The complete survey codebook is included.

by A. C. Wolfe; M. M. Chapman  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Contract FH-11-7535  
Rept. No. UM-HSRI-AL-72-5; PB-221 194 ; 1972 ; 63p  
Prepared for the Washtenaw Alcohol Safety Action Program,  
Washtenaw County Health Dept., Ann Arbor, Mich.  
Availability: NTIS

HS-801 091

### **FIELD EVALUATION OF COURT PROCEDURES FOR IDENTIFYING PROBLEM DRINKERS. FINAL REPORT**

Alcohol Safety Action Projects (ASAPs) cooperated in field evaluation of HSRI-developed questionnaire and interview protocols for identifying problem drinkers. Responses from 709 Driving While Intoxicated defendants from three ASAPs, with differing demographic profiles and score distribution, were analyzed. To validate the test, a composite criterion, constructed from blood alcohol concentration at time of arrest and number of previous DWI and other alcohol offenses, was used to evaluate the test predictions. Validity and reliability data indicate the protocols provide useful performance. ASAP users were surveyed to determine their judgments about the operational effectiveness of the identification procedures, with positive attitudes found. An improved scoring key and a Spanish translation of the questionnaire were prepared, and other questionnaire revisions were made.

by L. D. Filkins; R. G. Mortimer; D. V. Post; M. M.; Chapman  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Contract DOT-HS-031-2-303  
Rept. No. UM-HSRI-AL-73-18; PB-231534 ; 1973 ; 94p 8refs  
Includes Questionnaire in Spanish.  
Availability: NTIS \$4.00

HS-801 107

### **BINOCULAR AND MONOCULAR FIELD OF VIEW PERFORMANCE TEST. FINAL REPORT**

To support rulemaking activities to Docket 70-7, "Fields of Direct View," the study obtained in-vehicle data from 30 new model passenger cars, trucks, and buses using different proposed monocular, binocular, and related testing procedures. A broad data base to compare in-vehicle compliance techniques and to establish performance requirements was obtained. Vision points for three direct look-to-rear situations in two passenger cars, one full-sized and one subcompact, were also examined. The results indicated an appreciable difference in vision points because of car size and configuration. Twenty-two passenger cars, seven trucks, and one school bus were tested for forward field of view, and the passenger cars were also tested for look-to-rear binocular field of view. The methods are included along with general information and relative vision points for each vehicle, and tables of monocular and binocular values.

by A. S. Kuroda; D. S. Boyer  
Tracor Jitco, Inc., Rockville, Md.  
Contract DOT-HS-256-3-688  
Rept. No. T/J-102-016 ; 1974 ; 305p refs  
Availability: NTIS

HS-801 113

### **PRELIMINARY STUDY OF THE RELATIONSHIP BETWEEN FAILURE OF RETREADS DURING FMVSS 109 TESTS AND FLAWS DETECTED BY NONDESTRUCTIVE TESTING**

A total of 144 retread tires were nondestructively tested, run on a standard FMVSS 109 wheel test, re-examined by non-destructive means, and analytically sectioned. The flaws found with propensity of the tires to fail are related statistically. Data show that there is a relationship in retreads between separations and propensity to fail wheel test. Moreover, certain tires, as classed by types of manufacture, are more prone to separations than others.

by S. N. Bobo  
Department of Transp., Cambridge, Mass. Transp. Systems  
Center  
Rept. No. DOT-TSC-NHTSA-73-1 ; 1973 ; 313p  
Rept. for Nov 71-Jun 72.  
Availability: Reference copy only

HS-801 114

### **ALCOHOL HIGHWAY-TRAFFIC SAFETY WORKSHOP FOR LAW ENFORCEMENT OFFICIALS**

This manual is designed to assist state officials in conducting 1 1/2 day workshops for law enforcement professionals to develop programs for coping with the drinking driver problem. Workshops are intended to focus on two needs: cooperation

and coordination among agencies and individuals, and the team member attitude on the part of agencies and individuals. Most workshop sessions take the form of small group discussions. The nature and scope of the alcohol highway safety problem are examined, followed by a discussion of the problems and deficiencies of the systems approach. Blood alcohol levels are studied following an alcohol awareness seminar demonstrating alcohol effects. Current approaches, including the team approach, to the drinking driver problem are outlined. Appendices include Governor's Representative pre-workshop instructions, instructions and materials for group moderators, miscellaneous information on the assembling and use of equipment and materials, and follow-up evaluation materials.

by W. Walker; P. Finn; E. Gottheil; B. Tannen  
Abt Associates, Inc., Cambridge, Mass.  
Contract DOT-HS-240-2-431  
1973? ; 198p refs  
Availability: Reference copy only

HS-801 115

### **ALCOHOL HIGHWAY-TRAFFIC SAFETY WORKSHOP FOR LOCAL OFFICIALS**

This manual is designed to assist state officials to conduct 1 1/2 day workshops in which local officials develop programs for coping with the drinking driver problem. Workshops are intended to focus on the need for cooperation and coordination among involved agencies and individuals, and the need for them to consider themselves part of a team. Most workshop exercises take the form of idea-exchange sessions in small groups. The nature and scope of the alcohol highway safety problem are examined, followed by discussions of plans of action and current approaches. The role of rehabilitation agencies is considered. Alcohol awareness and blood alcohol levels are studied. Appendices include Governor's Representative pre-workshop instructions, instructions and materials for group moderators, miscellaneous information on the assembling and use of equipment and materials, and follow-up evaluation materials.

by W. Walker; P. Finn; E. Gottheil; B. Tannen  
Abt Associates, Inc., Cambridge, Mass.  
Contract DOT-HS-240-2-431  
1973? ; 210p refs  
Availability: Reference copy only

HS-801 116

### **ALCOHOL HIGHWAY-TRAFFIC SAFETY WORKSHOP FOR ALCOHOL REHABILITATION AND TREATMENT PERSONNEL**

This manual is designed to assist state officials to conduct one-day workshops in which alcoholism rehabilitation and treatment professionals develop programs for coping with the drinking driver problem. Workshops are intended to focus on the need for cooperation and coordination among involved agencies and individuals, and the need for them to consider themselves part of a team. Most workshop exercises take the form of idea-exchange sessions in small groups. The nature and scope of the alcohol highway safety problem are examined. Current approaches to the problem, including the team approach are discussed. Drinking driver modalities are also studied. Appendices include Governor's Representative

pre-workshop instructions, instructions and materials for group moderators, miscellaneous information on the assembling and use of equipment and materials, and follow-up evaluation materials.

by W. Walker; P. Finn; E. Gottheil; B. Tannen  
Abt Associates, Inc., Cambridge, Mass.  
Contract DOT-HS-240-2-431  
1973? ; 194p refs  
Availability: Reference copy only

HS-801 117

### **ALCOHOL HIGHWAY-TRAFFIC SAFETY WORKSHOP FOR STATE OFFICIALS**

This manual is designed to assist state officials to conduct two-day workshops in which state officials with alcohol-traffic responsibilities develop programs for coping with the drinking driver problem. Workshops are intended to focus on the need for cooperation and coordination among involved agencies and individuals, and the need for them to consider themselves part of a team. Most workshop exercises take the form of idea-exchange sessions in small groups. The nature and scope of the alcohol highway safety problem are examined, along with drinking and driving information surveys, problems and deficiencies of the systems approach, current approaches (including the team approach), alcohol awareness, and blood alcohol levels. Appendices include Governor's Representative pre-workshop instructions, instructions and materials for group moderators, miscellaneous information on the assembling and use of equipment and materials, and follow-up evaluation materials.

by W. Walker; P. Finn; E. Gottheil; B. Tannen  
Abt Associates, Inc., Cambridge, Mass.  
Contract DOT-HS-240-2-431  
1973? ; 202p  
Availability: Reference copy only

HS-801 118

### **ALCOHOL HIGHWAY-TRAFFIC SAFETY WORKSHOP FOR THE JUDICIARY**

This manual is designed to assist state officials to conduct 1 1/2 day workshops in which judges involved with alcohol-traffic safety problems develop programs for coping with the drinking driver problem. Workshops are intended to focus on the need for cooperation and coordination among involved agencies and individuals, and the need for them to consider themselves part of a team. Most workshop exercises take the form of idea-exchange sessions in small groups. The nature and scope of the alcohol highway safety problem are examined, along with drinking and driving information surveys, problems and deficiencies of the systems approach, current approaches (including the team approach), alcohol awareness, and blood alcohol levels. Appendices include Governor's Representative pre-workshop instructions, instructions and materials for group moderators, miscellaneous information on the assembling and use of equipment and materials, and follow-up evaluation materials.

## HS-801 119

by W. Walker; P. Finn; E. Gottheil; B. Tannen  
 Abt Associates, Inc., Cambridge, Mass.  
 Contract DOT-HS-240-2-431  
 1973? ; 213p refs  
 Availability: Reference copy only

## HS-801 119

### **HIGHWAY SAFETY PROGRAM MANUAL VOL. 17 (INTERIM). PUPIL TRANSPORTATION SAFETY**

Designed to provide guidance to State and local governments on preferred highway safety practices, these guidelines of the Pupil Transportation Safety Standard and policies on a national uniform basis will assist the States in achieving the highest attainable level of safety in the transportation of school children. Driver training, pupil instruction, vehicle maintenance and program evaluation are considered in addition to funding criteria for 402 projects and local government participation in this program.

National Hwy. Traf. Safety Administration, Washington, D.C.  
 1973 ; 43p 15refs  
 One of 18 volumes. See also HS-820 036 through HS-820 050, and HS-801 120.  
 Availability: Corporate author

## HS-801 120

### **HIGHWAY SAFETY PROGRAM MANUAL VOL. 18 (INTERIM). ACCIDENT INVESTIGATION AND REPORTING**

An Accident Investigation and Reporting Standard manual is presented for establishing a uniform, comprehensive motor vehicle traffic accident investigation program for data acquisition and analysis. General policy is outlined, and program development and operation are detailed. Program evaluation, reports, and local government participation are also examined.

National Hwy. Traf. Safety Administration, Washington, D.C.  
 1972 ; 56p 23refs  
 One of 18 volumes. See also HS-820 036 through HS-820 050, and HS-801 119.  
 Availability: Corporate author

## HS-820 287

### **BASIC TRAINING PROGRAM. DRIVER LICENSE EXAMINER SUPERVISORS. TRAINEE STUDY GUIDE**

The trainee study guide portion of a standardized nucleus curriculum, aimed at contributing to licensing procedure efficiency and increased highway safety is presented. The guide is intended to act as a program compendium to aid the trainee in successfully completing the program. An orientation is given to driver license examiner supervision, agency services and standard operating procedures, and basic staff positions and responsibilities. Other topics covered include: licensing; equipment, facilities and supplies; personnel regulations; other responsibilities; the professional supervisor; communication, human relations, decision making, and motivation as leadership skills; agency program development; and training program termination. General course materials are also described.

by J. T. Pendleton; C. D. Patton  
 Technical Education Res. Centers, Inc., Champaign, Ill.  
 Contract DOT-HS-100-2-391  
 1973 ; 145p refs  
 See also HS-820 288, HS-820 289, and HS-800 904.  
 Availability: GPO \$1.95

## HS-820 288

### **BASIC TRAINING PROGRAM. DRIVER LICENSE EXAMINER SUPERVISORS. INSTRUCTOR'S LESSON PLANS**

Instructor's lesson plans are presented as part of a standardized nucleus curriculum, Training Driver License Examiner Supervisors, which is aimed at improving the efficiency of licensing and at increasing safety on highways. The lesson plans contain guidelines on program presentations and a complete curriculum guide. Instructor preparation for objectives and scheduling is discussed. Lesson plans include units on orientation, coordination of standard operating procedures and policies, leadership skills, agency program development, and training program termination. Appendices include suggestions for making instructions more effective, instructional aids, evaluations, case studies, and teaching techniques.

by J. T. Pendleton; C. D. Patton  
 Technical Education Res. Center, Inc., Champaign, Ill.  
 Contract DOT-HS-100-2-391  
 1973 ; 224p 34refs  
 See also HS-820 289, HS-820 287, and HS-800 904.  
 Availability: GPO \$2.50

## HS-820 289

### **BASIC TRAINING PROGRAM. DRIVER LICENSE EXAMINER SUPERVISORS. COURSE GUIDE**

A course guide is presented as part of a standardized nucleus training curriculum called Driver License Examiner Supervisors, which is aimed at improving licensing procedure efficiency and highway safety. The guide gives an overview of the total program, including instructor and resource requirements, instructor's lesson plans, and trainee study guide. Program particulars covered include program times, class size, trainee evaluations, instructional materials, facilities, program and resource personnel, instructional personnel, and fiscal considerations. Methods of presenting the training program are outlined, and driver license examiner supervisor requirements are given.

by J. T. Pendleton; C. D. Patton  
 Technical Education Res. Centers, Inc., Champaign, Ill.  
 Contract DOT-HS-100-2-391  
 1973 ; 33p 42refs  
 See also HS-820 288, HS-820 287 and HS-800 904  
 Availability: GPO \$.80

## HS-820 307

### **HIGHWAY SAFETY PROGRAM STANDARDS**

Highway safety program standards are reprinted with indicated additions promulgated by DOT, replacing the Highway Safety Program Standards publication issued in June 1969. Standards are reported for periodic motor vehicle inspection; motor vehicle registration; motorcycle safety; driver education; driver

June 27, 1974

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licensing; codes and laws; traffic courts; alcohol in relation to highway safety; identification and surveillance of accident locations; traffic records; emergency medical services; highway design, construction, and maintenance; traffic engineering services; pedestrian safety; police traffic services; debris hazard control and cleanup; pupil transportation safety; accident in-

vestigation and reporting; and vehicle in use inspection standards.

Federal Hwy. Administration, Washington, D. C.; National Hwy. Traf. Safety Administration, Washington, D. C.  
1974 ; 35p

Availability: GPO

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**CONTRACTS AWARDED**

.

## NHTSA CONTRACTS AWARDED

### **DOT-HS-027-3-785 Mod. 4**

#### **LABORATORY TEST PROCEDURES**

General Environment Corporation  
6840 Industrial Road  
Springfield, Va. 22151

No change

\$7,200.00

Examination and appraisal of damage inflicted upon vehicles which have been tested to the requirement of FMVSS No. 215, Exterior Protection, will be made. Six of the vehicles tested will have received 5 mph frontal and rear impacts only. An additional six vehicles will have had pendulum tests followed by 5 mph frontal and rear impacts.

### **DOT-HS-034-2-410 Mod. 4**

#### **RAPID RESPONSE GENERATION OF CRASH DATA**

Indiana University Foundation  
P.O. Box F  
Bloomington, Ind. 47401

Extended to 1 Mar 75

\$10,338.00

Additional data will determine whether the frequency of belt restraint usage in 1974, automobiles, as previously observed under this Contract, fluctuates according to time or seasonal variation. Data will be collected for three one-month periods at three month intervals, between May 1974 and January 31, 1975.

### **DOT-HS-066-3-782 Mod. 2**

#### **LABORATORY TEST PROCEDURES**

Agabian Associates  
250 North Nash Street  
El Segundo, Calif. 90245

No change

\$6,249.00

Examination and appraisal of damage inflicted to vehicles tested to the requirement of FMVSS No. 215, Exterior Protection, will be made. Criteria to be used in appraisal is restoration of vehicle to a level which would be acceptable to the consumer. Ten vehicles to be appraised will have damage from 5 mph frontal and rear impacts only. Ten vehicles will have damage from pendulum tests followed by 5 mph frontal and rear impacts.

### **DOT-HS-067-1-087 Mod. 16**

#### **THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT**

Virginia Highway Safety Division  
P.O. Box 27472  
Richmond, Va. 23261

Extended to 30 June 75

\$64,818.00

Final reports, complete analytical studies, disposal of property, audits and fiscal actions will be completed for this Project which has been in progress since 23 December 1973.

### **DOT-HS-157-2-247 Mod. 11**

#### **DELAWARE SAFETY ACTION PROJECT**

Department of Public Safety  
P.O. Box 818  
Dover, Del. 19901

Extended to 31 Dec 75

\$41,343.00

Data obtained toward the project objective of reduction of alcohol related highway crashes by 30% in the third year of the project operation will be compiled and evaluated into a final report. Guidelines for evaluation of the total project will include: reproducibility of criteria parameters; data that can be validated; interagency and countermeasure relevance; measure of significance; measures of or degree of bias; complete objectivity; clarity and understandability of conclusions.

### **DOT-HS-289-3-550 IA Mod. 2**

#### **FINITE ELEMENT MODEL OF HEAD**

Civil Engineering Laboratory  
Naval Construction Battalion Center  
Port Hueneme, Calif. 93041

Extended to 30 Sept 74

\$64,000.00

The overall objective is to develop a computer program to validly simulate detailed dynamic structural deformation response and to predict head injury for any given hazardous situation. In an effort to define the role of cranial deformation, head motions and compression waves on induced damage to the head, finite element models of the head of the human and certain

primates will be developed. These will be used to gain a detailed understanding of injury mechanisms; define tolerance envelopes; predict dynamic responses and injuries to specific accident environments; predict the actual contact forces between the body and other deformable structures; and to conduct evaluations of the sensitivity of responses to change in the system parameters.

**DOT-HS-303-3-576 Mod. 3**

**VEHICLE LEASE AGREEMENT BETWEEN NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION AND PETERSON, HOWELL AND HEATHER, INC.**

Peterson, Howell and Heather, Inc.  
PHH Fleet Management Services  
2701 North Charles Street  
Baltimore, Md. 21218

Extended 4 months

\$16,660.00

General Motors Corporation has produced a limited number of passenger cars equipped with air cushions and is desirous of obtaining field experience with these cars. Peterson, Howell and Heather, Inc. as sublessee shall notify GM of any problems experienced with activation of the air cushion or failure of the readiness light indicator which may become apparent during their use of these vehicles.

**DOT-HS-4-00805 Mod. 2**

**SAFETY BELT INTERLOCK SYSTEM: USAGE SURVEY**

Opinion Research Corporation  
North Harrison Street  
Princeton, N. J. 08504

Extended to 27 April 74

\$34,023.00

Collection of data on safety belts will continue at the two Toronto airport terminals. Thirty rental cars will be modified from seat belt warning systems to sequential warning systems and 25 cars will be converted from safety belt sequential warning systems to warning-only systems. The Contractor will be responsible for installation and maintenance of the devices. The modified cars will be rented in a manner which will allow maximum usage of the vehicles. Observers will record safety belt usage at the terminals and interviews will be conducted with some non-users. Spotters will collect vehicle data to determine if the use-inducing systems are operational, correcting those which are non-functional.

**DOT-HS-4-00874**

**REPAIR OF GSA TIRE TESTERS NOS. 1 AND 2**

General Electric Company  
One North Charles Street  
Baltimore, Md. 21201

4 Apr 74 to 1 June 74

\$9,463.00

Labor, material and technical assistance shall be furnished to replace the existing shaft and bearings, static balance flywheel, and to readjust the drive regulator on GSA Tire Testers Nos. 1 and 2, located at Safety Systems Laboratory, Riverdale, Maryland.

**DOT-HS-4-00875**

**REVIEW AND EVALUATION OF PEDESTRIAN/ BICYCLIST SAFETY POLICIES, PROCEDURES, METHODS, AND CAPABILITIES**

International Association of Chiefs of Police, Inc.  
Eleven Firstfield Road  
Gaithersburg, Md. 20760

18 Mar 74 to 1 Sept 74

\$30,050.00

The project is designed to meet the requirement of Section 214 of the Highway Safety Act of 1973 calling for a review and evaluation of pedestrian/bicycle law enforcement policies, procedures, methods, practices and capabilities. Site visits will be made to 30 sites selected at random in cooperation with representatives of the National Committee on Uniform Traffic Laws and Ordinances and to the National Highway Traffic Safety Administration. These visits shall be to obtain copies of regulations; assess enforcement policies and rationale; determine enforcement procedures and practices; delineate weak and strong points of the program; and to assess the financial and manpower capability to conduct effective programs.

**DOT-HS-4-00883**

**DEVELOPMENT OF AN INSTRUCTIONAL MANUAL ON EVALUATION OF STATE AND COMMUNITY TRAFFIC SAFETY PROGRAMS**

Indiana University Foundation  
P.O. Box F  
Bloomington, Ind. 47401

29 Mar 74 to 29 Mar 75

\$70,347.00

An instructional manual for use as a training textbook for Governors' Representatives and their staffs is to be developed. Following a review of NHTSA program documents for requirements, concepts and procedures of traffic safety, and a review of management's needs for evaluation of state and local performance, the Contractor will evolve a source document for a Conference to be attended by representatives of NHTSA,

and by State and other agencies concerned with evaluation of traffic safety programs. Alternative evaluation concepts which may be presented at the Conference will be incorporated in the manual which is to cover administration and scientific evaluation insofar as the concepts and methodologies of cause-and-effect determination are appropriate to the evaluation of state and community highway safety programs projects and tasks.

**U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION**

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